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ONTARIO

A Protocol For Forest Management Planning Science Support

A Protocol For Forest Management Planning Science Support

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FOREWORD

The *Protocol for FMP Science Support* was developed in response to a demand for improved science in Forest Management Plans. The enthusiastic response to the development of the *Protocol*, and the participation of the people involved in various ways with management planning, confirmed quite clearly that the need was felt by many.

This document is intended to help management planning teams produce scientifically sound plans. Please familiarize yourself with its contents and use it as a reference when producing an FMP. The *Protocol* will be amended regularly. It will change and improve as the science of forestry changes and improves. Suggestions for improvements to the *Protocol* can be given to Regional Management Planning Specialists or Science Advisors.

The participation of all of those involved in the production of the *Protocol* is sincerely appreciated. Thank you to the members of the *Protocol* Task Team who applied their time, experience and knowledge to the task:

Roger Davison, Management Planning Specialist, Southcentral Region
Nancy Houle, Management Planning Specialist, Northeast Region
Dean Phoenix, Wildlife Assessment Unit Program Leader, Boreal Science Section
Scott Reid, Great Lakes-St. Lawrence Forest Analyst, Southcentral Science Section

Thank you also to Ralph Wheeler, Manager, Boreal Science Section, for getting the ball rolling and for his patience and support throughout.

John Copeland, Area Forester, Chapleau District
Task Team Coordinator

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Protocol for FMP Science Support

INTRODUCTION

The Protocol for FMP Science Support was developed to address a number of perceived problems related to the inclusion of science in Forest Management Plans. These perceived problems include:

- lack of capacity to support FMP teams
- uncertainty on the part of Regional Directors and District Managers about the quality of plans they were approving or recommending for approval
- staying current with new requirements for the content of FMPs as outlined in the CFSA and the Forest Management Planning Manual (FMPM)
- lack of direction for planning teams on implementation of parts of the FMPM
- lack of integration between planning and science units to deal with developing science and providing direction for its use
- inconsistent application of science in FMPs resulting in variable plan quality
- no clear system for setting priorities to develop science needed for FMP production

The Protocol attempts to address these problems by clarifying roles and relationships and developing mechanisms to ensure that planning teams can produce FMPs using the best available science. In order to ensure the success of the Protocol it must be viewed not as a document, but as a commitment to work together to ensure the production of high quality, scientifically sound FMPs. The successful implementation of the Protocol involves staff at the provincial, regional and district levels, as well as forest industry members of planning teams. Roles relative to the Protocol are summarized in Appendix IV. An organizational chart showing the various units of the Science Development and Transfer Branch is found in Appendix V. Early attention to the science aspects of a plan (eg. Seeking science support, determining science content) is **essential** to produce a quality plan.

PURPOSE

The forest industry, represented by Sustainable Forest Licence holders, has the primary responsibility for producing Forest Management Plans. The SFLs provide a plan author. The plan author is supported directly by a planning team which includes both forest industry and MNR staff, and sometimes others (eg. Local Citizens Committee members). An important role of MNR relative to FMP production is to provide support to plan production, through review, training, etc. MNR also has responsibility for plan approval.

The Protocol for FMP Science Support is an agreement between the MNR's Regional Directors, Regional Science Units, Regional Planning Units and District Managers, representing Regional Science and Planning staff and FMP planning team members. The agreement defines their working relationships, and that of planning teams, in the development, review and approval of FMPs, with the intent of ensuring that:

- science support currently available to planning teams for FMP production is identified, and teams are provided adequate assistance to access that support
- planning teams can identify their science support requirements early in the process
- plans incorporate the best available science, at the best possible time, consistent with policies, guidelines and standards
- roles are clearly defined in the development and approval of FMPs with respect to the inclusion of science in the plans
- all legal obligations are met
- a mechanism is established to promote ongoing improvements to the science in FMPs, including identifying and prioritizing science gaps and making science based recommendations for changes to policies, guidelines and standards

Some components of the Protocol address the immediate needs of Planning teams, while some components are intended to help future planning teams.

FMP PRODUCTION

The protocol is intended to make the best science available to planning teams to produce their FMPs. Planning teams will strive to produce scientifically sound FMPs by identifying appropriate planning team roles and responsibilities in their Terms of Reference and by identifying the tools and science which they intend to use.

a) **Science Advisors** - An advisor from a Science Unit will be assigned to each planning team by the Regional Science Unit Coordinators. Science advisors will be individually recommended to the Coordinators by a Regional FMP Team based on the perceived needs of the planning teams and availability of science staff.

Science advisors, as consultants to the planning team, not members, will familiarize planning team members with the Science Protocol, including the *Current FMP Science Support* table (Appendix II), and will maintain contact with the planning team throughout the production of the plan. Advisors will not actually produce parts of the plan.

Science advisors will deal directly with questions related to their own areas of expertise. They will also act as liaison between the planning teams, the Science Units, and other parts of the Science Development and Transfer Branch, such as the Ontario Forest Research Institute and the Centre for Northern Forest Ecosystem Research.

b) **Regional FMP Teams** - Each Regional FMP Team represents a network consisting of a Regional FMP Specialist, one or more representatives of the applicable Science Unit(s) for the Region, and members of district planning teams (forest industry and MNR) currently involved in producing a plan. The primary role of the Regional FMP Teams is to guide planning teams through the production of their FMPs . To implement the Protocol the membership and mandate of these teams will expand.

The Regional Planning Unit will coordinate regularly scheduled Regional FMP Team meetings to answer questions and provide direction to planning teams. Regional FMP Team meetings will include conference calls and occasional face-to-face meetings. Regional FMP Specialists will be standing members of the team. Regional Science Unit representatives to the team will be appointed for a one-year minimum term. At these meetings science questions will either be dealt with directly or referred to an appropriate Science Unit person not in attendance. When it is necessary to provide formal regional direction or interpretation of policies, guidelines and standards, the Regional Forest Program Specialist will participate in Regional FMP Team meetings.

c) **Science Support Meetings** - After an FMP planning team has been established, and a science advisor assigned to it, the team members will meet with their advisor, a Regional Management Planning Specialist, the District Manager, and selected Regional Science Unit staff to initiate discussions on the science content/approaches (eg. How to emulate natural disturbances, what models to use) for their plan, and on their science support requirements. The planning team will give some thought to these topics prior to the meeting and come to the meeting with ideas and questions they may have.

The Science Support Meeting represents the early ideas of the planning team about how they want to develop their FMP. The meeting will occur as early in the planning process as possible. Some discussion of roles from the meeting may be used to develop the Terms of Reference. The timing of the meeting, however, is such that not all of the science needs/approaches will be finalized at that time.

The Science Support Meeting is not intended to create an additional workload for the planning team. Rather, it is intended to focus the timing of some of the planning to an early stage in the process to give the team a better chance to successfully produce its plan. The meeting will address the individual needs of the planning team, not the common or generic issues which can be dealt with at FMP training courses.

This Science Support Meeting will:

- provide the planning team the opportunity to ask questions and seek advice about approaches/tools they are considering using for their FMP
- help identify, and resolve, potential problems early in the planning process
- familiarize the planning team and the Science Advisor with their respective roles

- familiarize the planning team with how the Protocol can be used to support their FMP
- provide an opportunity to determine what support the planning team may require (eg. Advice, training, computer models)
- provide an opportunity for Regional staff to provide advice and feedback from debriefings of planning teams which have recently completed their plans
- lead to the development of a jointly produced customized training plan for the team which reflects their specific needs
- give District Managers the opportunity to familiarize themselves with the intentions of the planning teams and develop a level of comfort with the science proposed
- provide an opportunity to establish timelines for producing drafts of specific sections of the plan for review by science support staff
- help Regional Science Managers work with staff to prioritize workloads
- provide input towards the completion of the Terms of Reference

d) **Science Support Tables** - The *Current FMP Science Support* table identifies support which is currently available to planning teams. Use by the planning teams of the support identified in the table should lead to the production of scientifically sound FMPs. The table also identifies when in the plan production process a particular science support item should be considered by the planning team. Appendix I summarizes the critical times in the plan production process.

Planning teams needing advice or assistance with a science related topic can contact the appropriate Science Unit staff member as identified in the *Current FMP Science Support* table. If the contact person is not known, the planning team's science advisor or one of the Regional FMP Specialists can identify the contact. Inclusion in the table does not imply any particular level of support by that person.

Science Unit staff, when contacted about FMP science issues, may provide extension in the form of advice, interpretation or training. Questions which they are unable to answer because of a science gap will be passed on to a Regional FMP Specialist to incorporate into the *FMP Science Needs* table (Appendix III). Science Unit staff will keep the Regional FMP Specialists advised of their involvement with planning teams to ensure that training efforts are not duplicated.

Science Unit staff will provide extension services to planning teams or FMP Specialists by reviewing specific sections of FMPs and commenting on the correct application of science direction provided to planning teams during the development of their FMPs. The need to review portions of an FMP could arise at any time during the planning process. Science Unit staff will not recommend FMP approval or rejection, but will be available for consultation as required. Science review does not imply that a particular section of a plan will be recommended for approval. The role of recommending FMPs for approval belongs to the District Manager and FMP Specialists. The Regional Director will make the ultimate decision whether to approve a plan. If a science related issue arises during the preparation of a plan the Regional Director or

District Manager will seek advice from Science Unit staff as part of the issue resolution process. Roles described for FMP production would also apply to major FMP amendments.

TRANSITION AREAS

Forest Management Units in the transition between the Boreal and Great Lakes-St. Lawrence Forest regions will rely on both the South Central Science Unit and the Boreal Science Unit for FMP support. Since the Northeast Regional Director is responsible for approving most of those FMPs, it will be the responsibility of the Regional FMP Specialists for the Northeast Region to ensure that science direction provided to the management units in the transitional area is acceptable to the Northeast Region and to recommend approval to the Regional Director. If science direction is provided by the South Central Sciences Section for an FMP, The Northeast Regional Planning Unit, Northeast Science Unit (NEST) and the SCSS will maintain close communications from the beginning of the planning process to ensure that this happens. The same approach would apply in reverse if any science extension is provided by NEST staff to districts in the South Central Region.

The NE Regional FMP Team will include representatives of both NEST and the SCSS to deal with issues which may arise relative to the transition areas.

FMP SCIENCE COMPETENCY

The MNR is developing a Forest Management Competency Program which will identify the competencies necessary for staff involved in forest management. The program will also identify methods of achieving those competencies. Methods could include training, apprenticeship, mentoring, job exchange, etc. Planning team members will likely obtain competency in science related topics mainly through training. Three types of training are necessary for planning team members:

a) Continuous Learning - Staff will develop knowledge in areas such as sustainability, ecosystem management principles, etc. Much of this training will be provided outside of the FMP planning cycle.

b) FMP Training - Training which is considered necessary for all planning teams to successfully produce an FMP will be provided by the Regional Planning Units. This will include training in science related topics. Some of this training will be delivered by Science Unit staff with expertise in particular topics.

c) Custom Training - Planning teams may require training unique to their needs. These training needs will be identified at their Science Support Meeting and an appropriate delivery mechanism determined.

Developing science competency in members of planning teams will decrease reliance on science support staff during plan preparation and will improve plan quality.

CAPACITY

Science Units presently do not have the resources to provide full support in the development of all FMPs. This capacity shortfall may mean a less personal form of extension delivery than might be preferred. The Regional FMP Teams will discuss expected science support demands during their annual review of the Protocol. The demands will be compared with capacity to deliver in order to set priorities and targets for the coming year's Work Program Plan. Ability to deliver required science support will be considered by Science Unit Coordinators in their Human Resources strategies.

Capacity of Science Units to implement all aspects of the Protocol will be reflected in their ability to provide a science advisor to each planning team, to provide the support identified in the *Current FMP Science Support* table, to address needs identified in the *FMP Science Needs* table, and to participate as members of the Regional FMP Teams. In order to perform all of these tasks and provide better support to planning teams, at current staffing and funding levels, priorities within the Science Units may have to change.

PROTOCOL MAINTENANCE

The Protocol for FMP Science Support will be reviewed on an annual basis by a team appointed specifically for to ensure that it remains current and relevant. Since the Protocol applies to each of the Regions, the review team will consist of members of each Regional FMP team. This will ensure that an integrated approach is maintained. For the first year the review will be planned by the Protocol task team and led by the Regional FMP Teams. Subsequent reviews will be planned and led by the Regional FMP Teams. The Regional Planning Team Leaders, Regional Science Unit Managers and Science Unit Coordinators will provide input to the review. The Protocol task team will be dissolved following the first annual review of the Protocol.

SCIENCE SUPPORT TABLE

The *Current FMP Science Support* table will be maintained in conjunction with the Protocol itself. The table will be updated annually to add new support which has become available during the year and to make appropriate deletions or changes. New developments in science support (eg. models, guidelines, etc.) will be identified with the help of Science Unit staff who have been involved in addressing the needs identified in *the FMP Science Needs* table. The Protocol task team will coordinate the first annual table update. The review team will determine responsibility for subsequent updates.

FMP SCIENCE NEEDS TABLE

The *FMP Science Needs* table identifies current gaps in our science knowledge and support capabilities for meeting the requirements of the FMP manual and improving the scientific soundness of FMPs. The table will be maintained in conjunction with the Protocol itself. Each year the table will be updated to add needs that have been identified during the year and delete needs which are no longer relevant or have been addressed during the year. Science needs will be identified and recorded by FMP Specialists and Science Unit staff at Regional FMP Team meetings and Provincial FMP Team meetings, through contacts with individual planning team members, by review of recent changes to policies, legislation, etc., and at FMP debriefing sessions. The Provincial FMP Team consists of Provincial and Regional FMP specialists and planning analysts.

The table will be used by regional staff to develop work program plans, set individual performance targets and identify workloads, including extension needs. Items on the list will be prioritized by Regional FMP Teams prior to the development of work program plans. Normal team membership will be expanded for the priority setting meeting to include Science Unit managers and staff, and others as appropriate.

Science needs which are not within the mandate or capabilities of Regional staff to address will be referred to the appropriate agency or MNR administrative unit by Science Unit staff. The referral will include an indication of priority from the Region's perspective. FMP Science needs that are provincial in scope will be referred to the Provincial FMP Team. At an annual meeting this team will review the identified provincially significant FMP science gaps and set priorities for dealing with them. Membership of the Provincial FMP Team will be expanded for this meeting to include Science Unit managers and some staff of the Boreal Science and South Central Science Units. The Science Unit managers will ensure that the priority needs are dealt with by an appropriate working group.

The Planning Units are responsible for dealing with science needs requiring the development of policy direction and or changes to the FMPM. The Regional Forest Program Specialists and FMP Specialists will take the lead with these issues. Changes to the FMPM will be referred to the provincial FMP specialists.

APPENDIX I

Planning Schedule for a FMP scheduled for approval April 1, 2000

Science Needs

1. Jan 98 - Apr 98

Organizing for Planning up to the Invitation to Participate

- assembly of background info
  - direction from other sources
  - RPFO
  - resource inventory info
  - values maps
  - implementation manuals
  - Native Background Info Rpt
  - other Res. Mgmt Plans
- form planning team
- Identify LCC
- Terms of Reference
  - plan team members
  - duties/responsibilities
  - analytical models to be used
  - possible issues or conflicts
  - plan production schedule
  - public consultation schedule
  - communications plan
  - required funding
  - FMP 1,2

- may be required to help with resource inventories, values , etc..
  - critical fish habitats
  - VTE
  - rare flora and fauna
  - site type mapping
- science staff may be requested to make presentations to LCC, native groups
  - natural disturbance
  - wildlife habitat matrices
  - guidelines
- develop action plan to deal with any outstanding science needs
- will be required to confirm their involvement with individual teams as an advisor, reviewer, etc...
- should consider identifying where extension may occur, and who will take the lead; FMP Specialist to discuss prior to Terms of Reference being approved

2. April 98 - October 98

Invitation to Participate up to the 1st Information Centre

- General Description of Forest
- Analysis of Management Alternatives (AMA)
- Silv. Ground Rules (SGR's)
- Eligibility criteria
- Selection Criteria
- Summary map
  - preferred and optional harvest areas
  - 20-yr road corridors
  - past and approved harvest areas (15 years)
- LEAP, or other spatial tool

- science staff may be required to assist in describing the forest of the MU:
  - soils
  - landforms
  - ecology
  - site types
  - wildlife species present, and habitat requirements
  - fish resources
- science staff will be required to assist planning teams with:
  - the appropriate treatments for FU/site type conditions
  - interpretation of silv guides
  - yield curve development
  - natural and post renewal succession
  - old growth targets
  - habitat matrices
  - spatial analysis
  - development of objectives and AMA
- support may be required for economic valuation of alternatives, doing SEIM analysis
- planned training where science support may be required:
  - Prep for Analysis
    - growth and yield
    - succession
    - FU-site type
    - wildlife habitat
  - SFMM (same as above)
  - LEAP or other spatial tools
  - Analysis of MA
- if interested, attend info centre

3. Nov 98 - March 99	**Up to the 2nd Information Centre**
	n same requirements as for the 1st info centre, but with operational planning included
	  n AOC planning, prescriptions on maps and sup doc
	  n proposed harvest areas
	  n primary and secondary road corridors
	n draft sections of text should also be available
	  n SGRs
	  n Strategic Direction and Determination of Sustainability
	  n MU description
	n Analysis of Mgmt Alternatives
	  n graphs
	  n FMP tables
		n science input may be required to interpret guidelines when applying them to AOCs
		n any new science or guidelines available which will help with laying out cut blocks, applying guidelines
		n science input may be required in determining sustainability, evaluating alternatives for criteria and indicators, and objective achievement
		n reviewing draft sections of text when available
		n assistance may be required when completing FMP tables
		n may need to attend planning team meetings, or LCC meetings
		n if interested, attend info centre
		n input may be requested to help respond to public consultation

4. April 99 - July 99	**2nd Info Centre up to the draft Plan Submission** n this is that stage where the plan is being put together; most text will be written at this stage, tables will be completed; all graphs, final SFMM reports, etc should be produced for appendices n final sections of text for draft plan should be available n final maps for draft plan should be available	n this is the last opportunity to have input in plan before the planning team puts it all together n may have to attend planning teams meetings n this is the last opportunity for science support people to review products before they finalize them, and comment on whetherthe science advice has been applied as intended n DM's or RD may ask for support during Issue Resolution n could be asked to help with responses to public input related to complex science issues
5. July 99 - Sept 99	**Draft plan review** n draft plan is to be submitted around July 15th or so n MNR has 60 day internal review n first opportunity to see the plan all put together n FMP Specialist will coordinate regional review, and may direct certain sections to someone to review n provide list of alterations to district RPF before 60 days is up	n this is the latest date when SGRs must be reviewed, if they have not been reviewed prior to draft plan submission n science staff may have to follow up on any comments they had provided on draft sections prior to draft plan submission, i.e. review sections of plan n FMP Specialist may request that you review and provide comments as per the required format to be included into list of required alterations FMP specialist will determine whether the plan meets the requirements of the FMPM n RD or DM may request science support during Issue Resolution
5. October 99 - December 99	**Plan Revision** n public review is still ongoing, but internal review is complete n plan author will be starting the revisions n MNR RPF will be looking to finalize the List of Required Alterations	n science staff may be requested to discuss comments on FMP, and help plan author rationalize decisions n may need to support DM or RD in Issue Resolution

5. January 2000	**Final Plan Submission** n final check to see if plan addressed the Final List of Required Alterations n recommend for approval to RD n ??hopefully no Issue Resolution??	n FMP Specialist may need clarification as to whether or not an alteration was properly or adequately addressed n Issue Resolution, if required
6. February - March 31, 2000	**Public Inspection - 30 days during which time public can request a bump-up; 45 days for MOE response to bump up** n if bump-up is requested during this time, district/company must put a package together with all their supporting documentation around the issue, to demonstrate that they have followed the process, and considered all views, adequately addressed all concerns, and rationalized their decisions n this response from MNR is due back to MOE within 15 days of the request	n in the case where the bump-up request is over science related issues, a specific science unit staff member may be requested to review the package

The current science support available to planning teams has been summarized in two tables entitled ***Current FMP Science Support***. Most of the information found in the tables is identical. However, one table is organized by topic and the other by reference to sections of the FMP manual.

An explanation of the fields follows:

Science Requirement - This describes the planning need which can be addressed by the available support.

Page References - Refers to sections of the FMP manual which may deal with the Science Requirement.

Current References, Contacts and Support - Identifies the support that is available to address the Science Requirement (eg. Contact names, models, etc.)

Location Codes:

NWST - Northwest Science and Technology
TB - Thunder Bay Ken - Kenora
CNFER - Centre for Northern Forest Ecosystem Research - Th. Bay
SSM - Main Office, Sault Ste. Marie
AFFMB - Aviation, Flood and Fire Management Branch - SSM
OFRI - Ontario Forest Research Institute, Sault Ste. Marie
NEST - Northeast Science and Technology - Timmins
SCSS - South Central Science Section
NB - North Bay Bra - Bracebridge Kem - Kemptville
Pet- Peterborough Lon - London
LUPB - Land Use Planning Branch
RPU - Regional Planning Unit
Tim - Timmins
WFR - West Fire Region - Dryden EFR - East Fire Region

When to Consider in the Planning Process - The planning process has been divided into distinct time periods. An example of the time periods applicable to a 2000 FMP is given in Appendix I. The numbers in the ***When To*** field of the table relate to the numbers in Appendix I. For example, a 2,3 in the When To field indicates that the Science Requirement would need to be considered in the time periods beginning in April 1998 and November 1998.

Legal Requirement - Identifies any legal requirements to be considered relative to the science requirement. Some support items are legally required by the FMP manual, others are optional. Some support items are not legal requirements themselves, but help to ensure that a legal requirement is met.

Issue Addressed - This is a checklist for planning teams to identify which science requirements they will be addressing in the production of their plans. It can be used to help establish Terms of Reference at the beginning of the planning process.

List of FMP Science Support Staff

Northwest Science and Technology Unit

Kenora - Area Code 807 468-XXXX

Name	Phone #	Position	Specialty
Colin Bowling	2645	Stand Management Forester	Growth and stand development as it relates to stands of all ages with an emphasis on the development of young to immature stands.
Bob White	2649	Forestry Specialist	All silvicultural practices, focus on LEAP spatial analysis, ELC.

Thunder Bay- Area Code 807 939-XXXX

Name	Phone #	Position	Specialty
Terry Marshall	3105	Aquatic Program Biologist	Science of fish populations and aquatic habitat with a focus on walleye.
Brian Polhill	3121	Stand Establishment Specialist	All silvicultural practices with an emphasis on early stand establishment and vegetation management techniques.
Kim Armstrong	3135	Aquatic Science Leader	All aquatic science with a focus on sampling techniques, smallmouth bass, and aquatics science as it relates to resource management decisions.
Gerry Racey	3102	Senior Science Specialist	Ecological land classification and systems including FEC, Ecosites, Wetland classification, landscape level analysis. NWR caribou expert.
Phil Elkie	3112	Forest Landscape Specialist	Specializes in spatial analysis using GIS technology. Emphasis on analysis of Prime Land in NW Ont., Marten and Caribou habitat supply modeling Spatial analysis using LEAP, Patch Analyzer etc.
Bill Towill	3103	Stand Dynamics Forestry Specialist	All silviculture techniques with emphasis on early and late stand succession pathways.

Centre for Northern Forest Ecosystem Research

Thunder Bay- Area Code 807 343-XXXX

Name	Phone #	Position	Specialty
Bob Forslund	4005	Biomathematician	modeling, systems
Rob Mackereth	4009	Research Scientist	fish habitat
John McNicol	4002	Wildlife Specialist	Environmental Guidelines, Timber EA
Dave Morris	4006	Research Scientist	forest ecosystems
Rob Rempel	4018	Research Scientist	landscape analysis
Art Rodgers	4011	Research Scientist	ungulates, small mammals
Rob Steedman	4008	Research Scientist	aquatic ecosystems

Northeast Science and Technology Unit

Timmins- Area Code 705 235-XXXX

Name	Phone #	Position	Specialty
Wally Bidwell	1236	Forest Practices Specialist	Training Coordination, silviculture
Simon Bridge	1217	Forest Landscape Specialist	landscape ecology, natural disturbances, GIS
Chiadih Chang	1214	Hydrologist	Hydrology
Jim Duncan	1231	Forest Economist	Forest economics, analytical models
Alison Luke	1237	Forest Practices Specialist	Silviculture, vegetation management, SGRs
Steve McGovern	1211	Aquatic Science Leader	Impacts on riparian areas and fisheries
Kim Taylor	1230	Terrestrial Ecologist	Terrestrial Ecology, FEC, landscape ecology
Bob Watt	1234	Terrestrial Ecosystems Team Leader	Wildlife habitat, biodiversity, ecosystem management

Boreal Terrestrial Assessment Unit

Timmins: (705) 235-XXXX

John Parton	1238	Growth and Yield Specialist	Monitoring/Modeling Forest Dynamics
Dean Phoenix	1241	Wildlife Assessment Unit Program Leader	Wildlife Monitoring

Ontario Forest Research Institute

Sault Ste. Marie - Area Code 705 946-2981

Name	Ext.	Position	Specialty
Dave Baldwin	234	Landscape Ecology GIS Analyst	GIS, forest landscape patterns, disturbance regimes, ecological processes
Wayne Bell	225	Forest Vegetation Management Scientist	plant autecology, succession, floral diversity, disturbance effects on plants
Bill Cole	113	Forest Ecology/ Silviculture Research Scientist	forest/lake interactions, hardwood crown dynamics, coarse woody debris in lakes
Steve Colombo	218	Tree Stress Research Scientist	consequences of stresses (e.g., drought, heat, frost) on trees, climate change, bioindicators
Sylvia Greifenhagen	205	Pathology Research Forester	effects of insects and disease on seedlings and forests, loss prevention strategies
R.A. Lautenschlager	228	Forest Ecology and Management Research Scientist	effects of forest management on ecosystems, forestry/wildlife interactions, identifying and prioritizing research needs/concerns
Blake MacDonald	223	Forest Ecology and Management Research Scientist	mixedwood stand dynamics, natural regeneration, adaptive resource management
Tim Meyer	220	Provincial Pathologist	relationships among biodiversity, forest management and disease
Gina Mohammed	214	Tree Structure and Function Research Scientist	tree vigour, stress resistance, physiology, microtechnique
Ajith Perera	217	Landscape Ecology Research Scientist	forest landscape ecology, diversity indices, landscape patterns, effects of disturbance
Jim Rice	222	Boreal Silviculture Research Forester	boreal mixedwood silviculture, hardwood silviculture
Paul Sampson	211	Bioindicators Research Forester	physiologically based remote sensing, stock quality assessment
Frank Schnekenburger	167	Landscape Ecology Systems Analyst	analytical software, decision-support systems, database management
Bob Sinclair	166	Senior Genetics Technician	genetic resource management, GIS, seed zones, climate model
David Smith	118	Ecosystem Productivity Program Leader	growth and yield, density management diagrams, decision-support software, models
Peter Uhlig	139	Forest Ecologist	forest ecosystem classification, ecological land classification, succession

Forest Management Branch - Renewal Section

Sault Ste. Marie - Area Code 705 945-XXXX

Name	Phone #	Position	Specialty
Vacant	5737	Provincial Silviculturist	
Dennis Joyce	5894	Genetic Resource Management Coordinator	Scientific and technical support for addressing genetic/biodiversity concerns and tree breeding goals
Taylor Scarr	5723	Provincial Forest Entomologist	insect pest management, identifying areas eligible for treatment, summarizing past insect/disease depletions

Aviation, Flood and Fire Management Branch

Sault Ste. Marie - Area Code 705 945-XXXX

Name	Phone #	Position	Specialty
Rob Frech	5784	Fire Science and Prescribed Fire Specialist	Fire Science (ecology/ disturbance), fire management, effect of fire management on wood supply, prescribed fire, fire behaviour

East Fire Region

Peterborough - Area Code 705 755-XXXX

Name	Phone #	Position	Specialty
Dave Heaman	3226	Fire Science and Planning Specialist	Great Lakes St. Lawrence fire ecology, fire regimes and ecosites

West Fire Region

Dryden - Area Code 807 937-XXXX

Name	Phone #	Position	Specialty
Terry Curran	7247	Fire Science Specialist	Fire impacts, regime, cycle, ecology, behaviour, prescribed burning

South Central Science Section

Bracebridge - Area Code 705 646-XXXX

Name	Phone #	Position	Specialty
Al Corlett	5543	GLSL Forestry Specialist	GLSL Silviculture (tolerant hardwoods and conifer working groups), stand regulation theory and practice, silvicultural prescriptions, tree marking.
Bill Crins	5544	Ecologist	Biodiversity conservation, natural heritage, life science Gap Analysis, plant genetics, plant and wildlife biology & ecology.
Scott Reid	5547	GLSL Forest Analyst	Forest management & silviculture (GLSL), tree marking, integrated resource management, economic analysis, private land forestry, plantation management, forest stand analysis and prescriptions.
Henk Rietveld	5548	Fisheries Analyst	Fish habitat identification and protection, aquatic habitat inventory methods, statistics, experimental design, analysis, conflict resolution, municipal planning related to fisheries.
Margaret McLaren	5545	Wildlife Specialist	Wildlife field surveys, wildlife inventory and monitoring, wildlife population and habitat analysis, criteria and indicators for sustainability.

Peterborough - Area Code 705 755-XXXX

Name	Phone #	Position	Specialty
John Fraser	7723	Earth Science Specialist	Geological mapping, aggregate inventory, natural hazard geotechnical interpretation, fluvial geology, earth science natural heritage inventory and evaluation.

London - Area Code 519 661-XXXX

Name	Phone #	Position	Specialty
Ken Elliott	2714	Carolinian Forestry Specialist	Silviculture, forest ecology, municipal planning and forestry, private land forestry, tree marking.
Harold Lee	2806	ELC Ecologist/Data Analyst	Ecological land classification. Forest ecosystem classification.
Tim Williams	2738	Project Forester	Growth & Yield, data collection and analysis, silviculture.
Greg Greer	2726	Sr. Growth & Yield Tech	Growth & Yield, tree marking, scaling. data collection.
Norm Smith	2784	Fisheries Biologist	Aquatic habitat protection, mitigation, and rehabilitation, fisheries management planning, fisheries biology and management.
Angus Norman	2739	Wetlands/Wildlife Specialist	Wetland evaluation and restoration, wetland management, wetland evaluation training, wildlife management.
Paul Prevett	2749	Natural Heritage Ecologist	Plant and wildlife ecology, biodiversity conservation, natural heritage.

North Bay - Area Code 705 475-XXXX

Name	Phone #	Position	Specialty
Brian Batchelor	5562	Hardwood Program Leader	Tolerant hardwood silviculture, logging damage, tree marking, physical environment guidelines
Brenda Chambers	5550	Forest Ecosystem Program Leader	Forest ecosystem classification, ecological land classification, FEC mapping, forest unit development
Andree Morneault	5566	Vegetation Management Program Leader	Vegetation management, GLSL silviculture guidelines, ecosite vegetation dynamics
Brian Naylor	5564	Forest Habitat Program Leader	Habitat supply analysis, forest modeling, biodiversity and ecological sustainability analysis
Fred Pinto	5563	Conifer Program Leader	GLSL conifer silviculture, forest modeling, silvicultural effects monitoring and assessment
Murray Woods	5561	Growth & Yield Program Leader	forest growth and yield monitoring, assessment and modeling, forest unit development, stand density management, yield curve development for GLSL species
Merilyn Twiss	5613	Wildlife Assessment Program Leader	Wildlife inventory, population assessment and management, natural resource policy research and development

Kemptville - Area Code 613 258-XXXX

Name	Phone #	Position	Specialty
Eric Boysen	8240	Deciduous Zone Forest Specialist	Silviculture in the Great Lakes-St. Lawrence Forest Region, Private Land Forestry, Growth & Yield, forest restoration, plantation management, tree marking.
Cathy Nielsen	8204	Forest Diversity Specialist	Conservation biology: forest gene conservation, biodiversity monitoring and assessment, tree improvement, growth & yield, economic analysis.
Steve Kerr	8212	Fisheries/Aquatic Biologist	Aquatic habitat protection, mitigation, compensation, education, and training. Aquatic habitat inventory, classification, and assessment. Fisheries biology and management: stocking assessment, harvest control, evaluation of experimental size limits.
Kerry Coleman	8211	Wildlife Specialist	Wetlands evaluation, big game harvest assessment, ELC and ecosystem management, habitat evaluation.
Silvia Strobl	8412	Plantation Forest Specialist	Plantation establishment, vegetation management, GIS applications, silviculture.
Don Cuddy	8204	Deciduous Forest Zone Ecologist	Biodiversity conservation. Plant and wildlife ecology, natural heritage.

Appendix II - Current FMP Science Support (Topics)

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Assessing Sustainability					
Ability to quanitatively describe forest health and stress status in order to evaluate the impacts of forest management practices on forest ecosystems. Need to develop indicators to measure the sustainability criterion Forest Condition and Ecosystem Productivity.	A-16,42, 133	Literature regarding the use of remote sensing to assess forest condition. Data and estimation techniques and studies. Extension advice and contacts provided by Dave Smith , Paul Sampson and Gina Mohammed @ OFRI, John Parton @ NEST, Al Corlett (Bra) and Murray Woods (NB) @ SCSS, and John McNicol @ Terrestrial Ecosystems Branch (TB).	2,3	Net Primary Productivity needs to be calculated for the sub-regional area and the determination of the bounds of natural variation	
Ability to develop criteria and indicators for sustainability. Knowledge of Canadian Council of Forest Ministers (CCFM) and CFSA requirements.	A-38	Extension and FMP training sessions provided by Bob Watt @ NEST. Extension advice provided by Jim Duncan and John Parton @ NEST, Bill Towill and Gerry Racey @ NWST, Cathy Neilsen (Kem), Merilyn Twiss and Brian Bachelor (NB) @ SCSS, Dave Morris @ CNFER and John McNicol @ Terrestrial Ecosystems Branch (TB).	2,3	Need to deliver comprehensive training	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Knowledge of the impacts of non-renewable resource management activities (eg. aggregate extraction) on landscape scale ecological processes and sustainability. Knowledge of restoration of degraded ecosystems, especially as a result of extraction. Ability to develop approaches to the analysis of aggregate resource distribution, to develop resource access strategies and to evaluate geoscience and aggregates aspects of FMPs.	A-42, A-47	Extension advice provided by John Fraser @ SCSS (Pet).	2,3	to use in 5 & 20 year access planning	
Knowledge of inventory and assessment methods.	A-7, A-133	Extension advice provided by Al Corlett and Margaret McLaren (Bra) and Murray Woods and Merilyn Twiss (NB) @ SCSS.	1,2	to use when developing the Monitoring & Assessment section of FMP	
Assessing Sustainability, Forest Units and Silvicultural Ground Rules Knowledge of impacts of forest management activities, primarily harvesting, on future stand nutrition and site productivity.	A-42, A-92	Extension advice provided by Dave Morris @ CNFER, Gerry Racey, Bill Towill, Brian Polhill, Bob White and Colin Bowling @ NWST, John Parton, Alison Luke and Jim Duncan @ NEST, and Scott Reid (Bra) and Murray Woods (NB) @ SCSS.	2,3	Assist in understanding the Sustainability Criteria "Forest Condition & Ecosystem Productivity	
Assessing Sustainability, Historical Forest					

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Ability to define/interpret natural variation.	A-38	Extension advice provided by Simon Bridge, Bob Watt and John Parton @ NEST and Bill Crins (Bra) and Brian Naylor (NB) @ SCSS.	2,3,4	Required to define bounds of natural variation for many indicators of forest sustainability	
Assessing Sustainability, Silviculture, Landscape Processes Knowledge of ecosystem management, biodiversity conservation, sustainability indicators, wildlife habitat, impacts of forest management activities (conifer release - Lautenschlager) and natural disturbances on ecosystem components and landscape processes. Landscape level strategies for restoration of degraded ecosystems.	A-16,A42	Extension advice and published papers by R.A. Lautenschlager @OFRI. Extension advice provided by Bob Watt and John Parton @ NEST, Gerry Racey, Brian Polhill and Bill Towill @ NWST, Al Corlett and Margaret McLaren (Bra), John Fraser (Pet), Fred Pinto (NB) and Paul Prevett (Lon) @ SCSS, Rob Rempel @ CNFER, and John McNicol @ Terrestrial Ecosystems Branch (TB).	2,3	Required for analysis of management alternatives in FMP	
Biodiversity Knowledge of how to set objectives for maintaining biological diversity at the site and landscape level.	A-38, A-83	Extension advice provided by Bob Watt, Simon Bridge and Kim Taylor@ NEST, Gerry Racey and Bill Towill @ NWST, Brian Naylor and Fred Pinto (NB), Bill Crins (Bra) and Paul Prevett (Lon) @ SCSS.	1,2,3,4	Required for developing FMP objectives	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Knowledge of plant ecology, diversity and early succession.	A-46	Extension advice provided by Wayne Bell @ OFRI and Brenda Chambers @ SCSS (NB).	2,3	assist when developing successional pathways in SFMM, operational prescriptions, silvicultural ground rules	
Knowledge of the ecology/autecology of various plant species, including vulnerable/threatened/ endangered species, and the potential impacts of forest management operations on them. Ability to develop site specific prescriptions to protectand/or restore particular plant species/ecosystems and ensure their continued existence.	A-86	Extension advice provided by Kim Taylor, Wally Bidwell and Alison Luke @ NEST, Bill Towill, Gerry Racey and Brian Polhill (TB) and Colin Bowling (Ken) @ NWST, Paul Prevett (Lon) and Andree Morneault (NB) @ SCSS.	3	Information required in order to develop site specific prescriptions	
Biodiversity, Landscape Processes Knowledge of management and protection techniques for protected/natural areas, and application of landscape ecology theories to these areas.	A-86	Extension advice provided by Kim Taylor, Bob Watt and Simon Bridge @ NEST, Gerry Racey @ NWST, John Fraser (Pet) and Bill Crins (Bra) @ SCSS, and Will Kershaw (Sudbury) and John Thompson (Tim) @ Ontario Parks Northeastern Zone.	2,3	Information required when developing prescriptions in order to protect these areas	
Fish Habitat					

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Knowledge of impacts of forest management operations on aquatic habitat.	A-86	Aquatic Habitat Training Workshop provided by Steve McGovern @ NEST. Extension advice provided by Henk Rietveld (Bra) @ SCSS, Kim Armstrong and Terry Marshall @ NWST, and Rob Steedman and Rob Mackereth @ CNFER.	1,2,3,4	Information required in order to develop site specific prescriptions	
Knowledge of water crossing impacts and sediment control measures.	A-86, A-121	Extension advice provided by Steve McGovern @NEST, Terry Marshall and Kim Armstrong @ NWST, Rob Mackereth and Rob Steedman @ CNFER and Henk Rietveld (Bra) @ SCSS.	3,4	Assistance when developing specific water crossing conditions to protect the aquatic ecosystem	
Knowledge of the Timber Management Guidelines for the Protection of Fish Habitat, the impacts of harvesting adjacent to fisheries,and forest-lake ecology.	A-87	Extension advice provided by Chiadih Chang, John Seyler, Charles Hendry and Steve McGovern @ NEST, Kim Armstrong and Terry Marshall @ NWST, Henk Rietveld (Bra) @ SCSS, Bill Cole @ OFRI, and Rob Steedman and Rob Mackereth @ CNFER.	3	Assistance required when implementing provincial guidelines	
Forest Units and Silvicultural Ground Rules Knowledge of policies related to forest health and silviculture activities (eg. red pine stump treatments). Knowledge of appropriate silviculture treatments in light of past stand disease history and potential future disease concerns.	A-46	Extension advice provided by Sylvia Greifenhagen or Tim Meyer @ OFRI. Extension advice provided by Jim Duncan @ NEST, Bill Towill and Brian Polhill (TB) and Bob White (Ken) @ NWST, and Al Corlett (Bra) @SCSS.	2,3	Assist in developing silvicultural prescriptions	

SCIENCE REQUIREMENT	PAGE REFERENCES	CURRENT REFERENCES, CONTACTS AND SUPPORT	WHEN TO CONSIDER IN THE PLANNING PROCESS	LEGAL REQUIREMENT	ISSUE ADDRESSED YES OR NO
Knowledge of how to incorporate the silviculture guides into the development of Forest Units and Silvicultural Ground Rules.	A-47	Extension advice provided by Alison Luke, John Parton and Wally Bidwell @NEST, Murray Woods (NB) and Al Corlett (Bra) @ SCSS, and Bill Towill, Brian Polhill, Bob White and Colin Bowling @ NWST. Annual workshop on Forest Unit development and the silviculture guides provided by Alison Luke @ NEST.	2	Required to develop FMP Sivicultural Ground Rules	
Knowledge of Tolerant Hardwood management, uneven-aged management, silviculture and stand dynamics.	A-49	Extension advice and occasional presentations provided by Bill Cole @ OFRI. Extension advice provided by Al Corlett (Bra) and Brian Batchelor (NB) @ SCSS	2,3	assist when developing silvicultural ground rules and site spec prescriptions	
Interpretation of the silvicultural guides for the development of Silvicultural Ground Rules and operational prescriptions.	A-49,A-86	Extension advice provided by Alison Luke, Wally Bidwell, Jim Duncan and John Parton @NEST, Al Corlett (Bra)(hardwoods), Brian Batchelor (NB) (hardwoods), Fred Pinto (NB)(softwoods), Scott Reid (Bra) and Silvia Strobl (Kem)(plantations) @ SCSS, and Bill Towill and Brian Polhill (TB) and Colin Bowling and Bob White (Ken) @ NWST.	2,3,4	Assist in the development of the Silvivultural Ground Rules	
Ability to translate FRI data into FEC Ecosite description using SFMM Tool.	A-7,A-48	Software has been developed for Central Ontario ecosites. Contact Fred Pinto or Brian Naylor @ SCSS (NB) for information. Contact Bob Watt or Simon Bridge @ NEST, Gerry Racey or Bill Towill @ NWST.	1,2,3,4	Assists in forming ecosite based forest units and mapping ecosites for the 5 year planned activities, in order to link to the SGRs	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Forest Units and Silvicultural Ground Rules, Assessing Sustainability					
Knowledge of Boreal Mixedwood management.	A-47	Extension advice and management interpretations provided by Blake MacDonald, Jim Rice, and Tim Meyer @ OFRI, Bill Towill @ NWST, Al Corlett (Bra) and Brian Batchelor (NB) @ SCSS, and Wally Bidwell @ NEST. Extension Notes have been produced. Scientific advice relative to Tables FMP-10 and FMP-13 provided by Blake MacDonald and Jim Rice @ OFRI.	2,3	assist in developing silvicultural ground rules and site specific prescriptions	
Forest Units and Silviculture Ground Rules					
Knowledge of Forest Ecosystem Classification and Silviculture Guides relative to silviculture ground rules and forest unit development. FEC Mapping requirements.	A-47, A-92	Extension advice provided by John Parton, Alison Luke and Simon Bridge @NEST, Brenda Chambers @ SCSS (NB), Al Corlett @ SCSS (Bra), Bill Towill, Gerry Racey and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST . FEC workshops offered by Kim Taylor @ NEST	2,3,4	Assistance is required in using new guides and the site type/ecosite classifications	
General					

SCIENCE REQUIREMENT	PAGE REFERENCES	CURRENT REFERENCES, CONTACTS AND SUPPORT	WHEN TO CONSIDER IN THE PLANNING PROCESS	LEGAL REQUIREMENT	ISSUE ADDRESSED YES OR NO
Need to identify the science needs and content for the plan and the specific responsibilities of each planning team member and advisor relative to these needs. Planning for science needs must begin early in the process, and expectations of planning team members and advisors must be clear. Ensure that at least one advisor is identified to liaise with science contacts during plan production.	A-3	Review the FMP Science Protocol and the FMPM for ideas on science content. Talk to MNR Regional Planning and Science Unit staff. Contact for SC Region is Scott Reid.	1	Terms of Reference must identify individual duties & responsibilities for each team member and plan advisor	
Knowledge of road construction in various terrains, road alignments, water crossing construction and cost esimates for roads and crossings.	A-80, A-121	Critiques of road alignments, etc. prolvided by the Northeast Region Engineering Unit - Bob Wilson, Ron Lapointe, Allan Chow. Water crossing training also provided.	2,4	Requirement to plan primary and secondary road corridors and water crossing locations.	
Growth and Yield Development of yield curves and calibration to local conditions. Knowledge of Density Management Diagrams and pre-commercial thinning impacts.	A-38	Extension advice and formal training provided by John Parton @NEST. Extension advice provided by Jim Duncan @ NEST, Bill Towill and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST, and Murray Woods (NB) and Al Corlett (Bra) @ SCSS.	1,2,3,4,5	Required to develop yield curves for modelling purposes (SFMM)	
Growth and yield algorithms which emulate actual conditions in natural and managed stands.	A-46	Extension advice and assistance in working with planning teams to develop Forest Unit specific yield curves provided by David Smith @ OFRI, Bill Towill, Brian Polhill and Colin Bowling @ NWST, Murray Woods (NB) @ SCSS, and John Parton and Jim Duncan @ NEST.	2	Growth & yield curves are required in forest models	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Landscape Processes					
Knowledge of the physiographic framework of landscapes and the influence of geologic structure and processes on ecosystems.	A-15	Extension advice provided by John Fraser @ SCSS (Pet).	1,2	assist in developing the Forest Description Section and understanding the connection of geologic structure and ecosystems	
Ability to define/interpret 2nd order watersheds.	A-38, A-16	Extension advice provided by Chiadih Chang and Simon Bridge @ NEST, Kim Armstrong and Terry Marshall @ NWST, and Dave Ferguson (Pet) @ LUPB.	1,2,3,4	Required for table FMP-6	
Knowledge of hydrogeology, watershed processes and impacts. Knowledge of watershed management.	A-38, A-16	An annual workshop can be delivered by Chiadih Chang @ NEST. Extension advice provided by Steve McGovern @ NEST, Kim Armstrong @ NWST and Rob Steedman and Rob Mackereth @ CNFER. The Northeast Region Engineering Unit will provide watershed management hydrology critiques.	1,2,3,4	Could assist in strategic & operational planning	
Landscape Processes, Fish Habitat Knowledge of the use of the MTO watershed calculation methods for determining water crossing sizes and ability to calibrate to local conditions. Knowledge of how to maintain natural channel function and avoid aquatic habitat fragmentation.	A-87, A-121	Extension advice provided by Chiadih Chang and Steve McGovern @ NEST in cooperation with the Northeast Region's Engineering Unit. Extension advice provided by Terry Marshall and Kim Armstrong @ NWST, Henk Rietveld (Bra) @ SCSS, and Rob Steedman and Rob Mackereth @ CNFER.	3,4	Assistance when determining bridge or culvert size installation specifications at the AWS stage	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Landscape Processes, Spatial Analysis and Tools Expertise in the use of GIS for planning - spatial analysis and modelling and/or site specific management objectives.	A-38, A-16	Extension advice provided by Chiadih Chang, Simon Bridge and Bob Watt @ NEST, Phil Elkie @ NWST, John Fraser (Pet) and Scott Reid (Bra) @SCSS, Bill Cole @ OFRI and Rob Rempel @ CNFER.	1,2,3,4	Required for strategic planning and determination of sustainability	
Landscape Processes, Wildlife Habitat Knowledge of ecology of wetlands and riparian areas (and other communities) and impacts of forest management activities on them.	A-86	Extension advice provided by Kim Taylor and Steve McGovern @ NEST, Gerry Racey and Kim Armstrong @ NWST (T. Bay), Angus Norman and Paul Prevett (Lon), Brian Naylor (NB) and Kerry Coleman (Kem) @ SCSS, and Rob Steedman, Rob Mackereth and Terry Marshall @ CNFER.	3	Information required when developing prescriptions in order to protect these areas	
Maps					
Knowledge of Ecological Land Classification and Mapping	A-7, A-15	Extension advice provided by Brenda Chambers @ SCSS (NB).	1,2	necessary for developing silvicultural ground rules and ecosite mapping	
Ability to identify cultural and heritag values for Values Maps	A-8	Luke Dallabona, Archeological Research Scientist, SSM, can provide advice.	1	Required to identify known and high potential cultural heritage areas.	
Models					

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Need to identify the analytical models to be used in support of the science needs. The FMPM requires that the T of R list analytical models to be used. The list will help to identify training and data and software requirements.	A-4	Review the FMP Science Protocol and the FMPM to find out what models are available. Talk to Bob Watt, Simon Bridge and Jim Duncan @ NEST, Gerry Racey and Phil Elkie @ NWST, Scott Reid (Bra) and Brian Naylor (NB) @ SCSS.	1	Terms of Reference must identify analytical models to be used in FMP preparation	
Models, Assessing Sustainability Expertise in SFMM modelling.	A-58	Extension advice and training provided by Al Corlett and Scott Reid (Bra) @ SCSS, Sylvain Levesque and Jim Duncan @ Northeast RPU, and Phil Elkie @ NWST.	2,3	Required when developing FMP	
Models, Fish Habitat, Wildlife Habitat Fish and wildlife inventory data is deficient for most forest management units. In order to ensure that plans consider the best scientific information available, better inventories are required. In lieu of inventory information, predictive models can be used.	A-7	Computer software to calculate shoreline slopes from OBM data. Training can be provided in inventory methods for collecting data on moose aquatic feeding areas, etc. Extension provided by the Wildlife Assessment Units, Steve McGovern, Simon Bridge, Chiadih Chang and Bob Watt @ NEST, Brian Naylor (NB) and Steve Kerr (Kem) @ SCSS, Kim Armstrong and Terry Marshall @ NWST, and Rob Steedman and Rob Mackereth @ CNFER.	1,2,3	Fisheries and wildlife information must be available (FMPM pg A-7).	
Models, Growth and Yield, Silviculture, Silvicultural Ground Rules					

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Knowledge of plantation response to spacing and thinning to incorporate into SFMM modelling and silviculture ground rules.	A-57	Decision support software has been developed for red pine, white pine, jack pine and black spruce. Contact Fred Pinto or Murray Woods @ SCSS (NB). Extension advice provided by Scott Reid (Bra), Ken Elliott (Lon) and Eric Boysen (Kem) @ SCSS, John Parton, Alison Luke and Jim Duncan @ NEST, Bill Towill and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST.	2,3	Forest model inputs that are required in SFMM	
Models, Natural Disturbance Knowledge of successional pathways for inclusion in SFMM model.	A-46	Software has been developed to predict changes in tree species composition in undisturbed stands in NB, Pembroke and Algonquin Park Districts. Changes can be predicted at the stand level or forest management unit level. Contact Fred Pinto @ SCSS (NB). Extension Advice provided by Alison Luke, John Parton, Jim Duncan and Kim Taylor @ NEST, Al Corlett and Scott Reid @ SCSS (Bra), Brenda Chambers @ SCSS (NB), Bill Towil, Gerry Racey and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST..	2	Required in SFMM model	
Models, Wildlife Habitat Habitat Supply Analysis software for moose, deer, marten, pileated woodpecker and red shouldered hawks.	A-38	Software has been developed by the SCSS for areas south and east of Sault Ste. Marie. Contact Brian Naylor or Fred Pinto @ SCSS (NB). Also contact Bob Watt or Simon Bridge @ NEST or Phil Elkie @ NWST for advice.	2,3	Required to analyze spatial distribution of proposed harvest areas in meeting FMP objectives	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Natural Disturbance					
Advice on ecosystem management approaches.	A-1, A-13	Extension advice and workshops for planning teams and LCCs provided by Bob Watt @ NEST, Gerry Racey @ NWST (TB), Brian Naylor(NB), Al Corlett (Bra), Silvia Strobl (Kem) and Ken Elliott (Lon) @ SCSS, and Rob Steedman @ CNFER.	1,2,3,4	Required to meet legislative & policy direction	
RPFO-5 requires that all natural depletions be reported. Non-fire depletions may have to be estimated.	A-7, C-35	Provincial Entomologist, Taylor Scarr, can provide 5 year depletion estimates for causes other than fire. Tim Meyer, Provincial Pathologist @ OFRI can provide advice on use of Landsat to map disease outbreaks. Rob Frech, AFFMB (SSM) can provide advice on fire depletions.	1	Natural depletions must be reported in RPFO	
Natural Disturbance, Historical Forest, Spatial Analysis and Tools, Landscape Processes					

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Need to determine historic fire regimes/cycles for a forest in order to do landscape level planning to emulate natural disturbances.	A-16, A-83	ONFIRE model helps predict fire regimes. Extension advice provided by Ajith Perera @ OFRI, John McNicol @ Boreal Science Unit (TB), Simon Bridge and Bob Watt @ NEST, Phil Elkie @NWST and by CNFER (contact the manager). Provincial database of wildfires from 1920 to 1995 is available on a CD from Dave Baldwin or Ajith Perera @ OFRI. Extension advice provided by Dave Heaman @ EFR (Pet), Terry Curran (Dry) @ WFR, Rob Frech @ AFFMB and Brian Naylor (NB) @ SCSS. Rob Frech can provide advice on SFMM inputs for fire disturbance.	2,3	Information to assist in establishing FMP objectives and the layout of harvest areas	
Natural Disturbance, Landscape Processes, Wildlife Habitat Knowledge of emulating natural disturbances, landscape ecology, and analysis of landscape patterns. Linkages between these and exceptions to the Timber Management Guidelines for the Provision of Moose Habitat. Linkages with caribou habitat management.	A-16, 46, 83	Extension advice and presentations to LCCs and planning teams provided by CNFER. Contact the manager. Bob Watt @NEST, Brian Naylor (NB), Bill Crins (Bra) and Paul Prevett (Lon) @ SCSS, Bob White (Ken) and Gerry Racey (TB) @NWST, Rob Rempel and Art Rodgers @ CNFER and John McNicol @ Terrestrial Ecosystems Branch (TB) can provide advice.	2,3,4	Required information for FMP development	
Natural Disturbance, Spatial Analysis and Tools, Assessing Sustainability, Models					

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Knowledge of the Landscape Ecological Analysis Package (LEAP) model, fragmentation, landscape ecology, spatial landscape statistics and GIS integration.	A-16, A-58	Extension advice provided by Bob Watt, and Simon Bridge @NEST , Bob White (Ken) and Gerry Racey (TB) @ NWST, Rob Rempel @ CNFER, Brian Naylor (NB), Scott Reid (Bra) and John Fraser (Pet) @ SCSS, and Ajith Perera, Dave Baldwin and Frank Schnekenburger @ OFRI. LEAP workship provided by Bob Watt. Landscape ecology extension advice provided by Kim Taylor @ NEST.	1,2,3,4	Required to analyze management alternatives in FMP	
Silviculture					
Knowledge of stand development and regulation. (Kem) @ SCSS, Alison Luke and Jim	A-38	Extension advice provided by Al Corlett (Bra), Ken Elliott (Lon) and Eric Boysen planning in FMPs Duncan @ NEST, Bill Towill and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST.	2,3	Required in strategic and operational	
Knowledge of old growth forests, management and silviculture	A-38, A-86	Extension advice provided by John Parton, Wally Bidwell and Alison Luke @ NEST, Fred Pinto and Brenda Chambers (NB), Al Corlett (Bra), Cathy Neilsen (Kem) and Ken Elliott (Lon) @ SCSS, Bill Towill and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST and Bill Cole and Tim Meyer @ OFRI.	2,3,4	Required for strategic & operational planning in FMPs	
Knowledge of Free-to-Grow and regeneration assessments and regeneration standards.	A-46,A-133	Extension advice provided by Al Corlett (Bra) and Fred Pinto (NB) @ SCSS, John Parton and Jim Duncan @ NEST, Bill Towill and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST, and Fred Pinto @ SCSS.	2,3,4	Assist in developing a monitoring and assessment program for inclusion in the FMP	

SCIENCE REQUIREMENT	PAGE REFERENCES	CURRENT REFERENCES, CONTACTS AND SUPPORT	WHEN TO CONSIDER IN THE PLANNING PROCESS	LEGAL REQUIREMENT	ISSUE ADDRESSED YES OR NO
Strategies to ensure success of artificial regeneration efforts.	A-47	Assessment of the physiological condition of stock prior to planting can be done by the Stock Quality Assessment Program @ OFRI. This practice may be identified as a silvicultural strategy in the FMP. Contact is Steve Colombo. Literature and a provincial database provide additional support. John Parton, Alison Luke and Jim Duncan @ NEST, Bill Towill and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST, and Silvia Strobl (Kem) and Andree Morneault (NB) @ SCSS can provide extension advice.	3,4	FMP implementation - planting stock assessment to determine physiological condition of stock prior to planting	
Advice on autecology and on the use of herbicides for stand establishment.	A-49, A-92	Extension advice provided by Alison Luke, Wally Bidwell and Jim Duncan @ NEST, Brian Polhill and Bill Towill @ NWST, Silvia Strobl (Kem) and Andree Morneault (NB) @ SCSS, and Wayne Bell @ OFRI.	2,3	Assist in developing Silvicultural Ground Rules	
Assistance with the development of silvicultural strategies	A-57	Extension advice provided by Alison Luke, John Parton and Jim Duncan @ NEST, Bill Towill, Gerry Racey and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST, Eric Boysen (Kem), Ken Elliott (Lon) and Al Corlett (Bra) @ SCSS, and Wayne Bell @ OFRI.	2,3	Required in FMPs	
Knowledge of methods for evaluating silvicultural effectiveness	A-57	Extension advice provided by Fred Pinto (NB), Al Corlett and Scott Reid (Bra) @ SCSS, Alison Luke, John Parton and Jim Duncan @ NEST, Bill Towill and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST.	3,4	Effectiveness monitoring is required for exceptions to the recommendations in the silvicultural guides	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Knowledge of careful logging practices to develop silvicultural strategies.	A-57	Extension advice provided by Brian Batchelor @ SCSS and Alison Luke and John Parton @NEST, and Brian Polhill and Bill Towill @ NWST.	2,3	Assist in developing silvicultural strategies	
Silviculture, Assessing Sustainability					
Knowledge of potential impacts of forest management practices, particularly silviculture practices, on species and genetic diversity.	A-46	Extension advice provided by Dennis Joyce @ SSM, Bill Towill and Brian Polhill (TB) and Colin Bowling (Ken) @ NWST, Al Corlett (Bra) and Cathy Neilsen (Kem) @SCSS, and Bob Watt @ NEST.	2,3	Assist in establishing best practices in order to meet FMP objectives for species and genetic diversity	
Silviculture, Forest Units and Silviculture Ground Rules					
Knowledge of vegetative competition, vegetation management options, plant autecology. Databases for plant diversity and succession for clearcuts, motor-manual cutting, mechanical cutting, herbicides, animal grazing, white pine shelterwood, and mechanical site preparation.	A-49	Extension advice and databases provided by Wayne Bell @ OFRI. Extension Advice provided by Alison Luke and Jim Duncan @ NEST, Bill Towill and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST, Paul Prevett (Lon), Andree Morneault (NB) and Silvia Strobl (Kem) @SCSS.		Assist in developing sivicultural ground rules	
Spatial Analysis and Tools					

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Need to provide a description of the forest.	A-15	Digital map of ecoprovinces, regions and districts, based on productivity, is available from Ajith Perera @ OFRI. It is known as the Hierarchical Ecoregional Framework (HEF), Spatial coverage of surficial geology and terrain is also available from OFRI. Additional advice can be provided by Kim Taylor @ NEST, Peter Uhlig @ OFRI, Dennis Joyce @ SSM, Rob Rempel @ CNFER or Phil Elkie @ NWST. Literature on forest regions/sub-regions is available (eg. Rowe, Hills).	1,2	Digital map of ecoprovince, regions and districts not a legal requirement additional information would enhance FMP	
Ability to use digitized elevation information for viewscape analysis, watershed level planning, species suitability, etc.	A-15,A-83	Digitized elevation information will be accessible through NRVIS. Extension advice and support on the Digital Elevation Model is available from Dennis Joyce @ SSM and Bob Sinclair @ OFRI. Advice can be provided by Simon Bridge and Chiadih Chang @ NEST and Rob Rempel, Rob Steedman and Rob Mackereth @ CNFER, John Fraser (Pet) and Bill Crins (Bra) @ SCSS, and Phil Elkie @ NWST.	3,4	Would assist in developing AOC prescriptions where viewscapes are recommended.	
Ability to use spatial analysis tools to assist in landscape planning.	A-38	CNFER can provide FMP training sessions/workshops - "Planning Your Analysis". Contact the manager or Rob Rempel. Also contact Bob Watt or Simon Bridge @ NEST, Brian Naylor (NB), Scott Reid (Bra) and John Fraser (Pet) @ SCSS, or Phil Elkie @ NWST.	2,3	Tools are required to assist in the spatial test for sustainability	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Values maps must be produced for all FMPs. Digitized values maps are easier to update and to use for mapping certain Areas of Concern.	A-8	District GIS Officers. Digital values data can be derived from the NRVIS data base.	1	Values maps are required.	
Ability to predict climatic variables, such as temperature and precipitation, for a given geographic location. This information can be used to plan tree seed requirements and limits to species' ranges.	A-94	Extension and advice on use of the software SEEDWHERE (used to predict seed demand) provided by Dennis Joyce @SSM. Extension advice provided by Simon Bridge @ NEST, Cathy Neilsen (Kem) @ SCSS, and Phil Elkie @ NWST.	4	Assist in developing the Renewal Support section of the FMP	
Wildlife habitat Knowledge of Marten Guidelines and Marten Habitat Supply Model. Ability to complete Table FMP-5 re marten habitat supply.	A-16,38,83	Extension advice and workshops by Bob Watt @ NEST, Brian Naylor @ SCSS (NB). Extension advice by Phil Elkie @ NWST and Jim Baker @ Forest Program Development Section (Pet).	2,3,4	Required in strategic and operational planning in FMP	
Wildlife Assessment Program: Will provide Provincial and Regional wildlife population trend information to identify species of concern. Will also provide context and sustainability test of habitat tracking of selected Species: see A-24. Knowledge of wildlife habitat inventory methods.	A-33, A-7	Contact the NE (Dean Phoenix), NW (Neil Dawson) or SC (Marilyn Twiss - NB) Wildlife Assessment Units, also Bob Watt @ NEST, Margaret McLaren @ SCSS (Bra) and Art Rodgers @CNFER.	1,2,3	Include available information on the quality, areal extent and population status of the species (FMPM pg. A-33)	
Knowledge of requirements for cavity tree retention/snag management.	A-86	Extension advice and field trips provided by Bob Watt @ NEST, Gerry Racey @ NWST and Brian Naylor @ SCSS.	2,3	Required for implementation of provincial implementation manuals	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Knowledge of wildlife habitat requirements for various species (eg. caribou, ospreys, eagles, herons, etc.).	A-86	Extension advice and field trips provided by Bob Watt @ NEST, Gerry Racey @ NWST and Brian Naylor @ SCSS. Literature references can be provided. Extension advice provided by the Wildlife Assessment Units, and Margaret McLaren (Bra) @ SCSS.	2,3,4	Assist in developing prescriptions in order to protect habitat requirements for various species	

Appendix II - Current FMP Science Support (Sections)

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
1.0 Organizing for Planning 2.0 Planning Process and Plan Content Requirements Advice on ecosystem management approaches.	A-1, A-13	Extension advice and workshops for planning teams and LCCs provided by Bob Watt @ NEST, Gerry Racey @ NWST (TB), Brian Naylor(NB), Al Corlett (Bra), Silvia Strobl (Kem) and Ken Elliott (Lon) @ SCSS, and Rob Steedman @ CNFER.	1,2,3,4	Required to meet legislative & policy direction	
1.3 Terms of Reference Need to identify the science needs and content for the plan and the specific responsibilities of each planning team member and advisor relative to these needs. Planning for science needs must begin early in the process, and expectations of planning team members and advisors must be clear. Ensure that at least one advisor is identified to liaise with science contacts during plan production.	A-3	Review the FMP Science Protocol and the FMPM for ideas on science content. Talk to MNR Regional Planning and Science Unit staff. Contact for SC Region is Scott Reid.	1	Terms of Reference must identify individual duties & responsibilities for each team member and plan advisor	
1.3 Terms of Reference Need to identify the analytical models to be used in support of the science needs. The FMPM requires that the T of R list analytical models to be used. The list will help to identify training and data and software requirements.	A-4	Review the FMP Science Protocol and the FMPM to find out what models are available. Talk to Bob Watt, Simon Bridge and Jim Duncan @ NEST, Gerry Racey and Phil Elkie @ NWST, Scott Reid (Bra) and Brian Naylor (NB) @ SCSS.	1	Terms of Reference must identify analytical models to be used in FMP preparation	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
1.4.2 Report of Past Forest Operations RPFO-5 requires that all natural depletions be reported. Non-fire depletions may have to be estimated.	A-7, C-35	Provincial Entomologist, Taylor Scarr, can provide 5 year depletion estimates for causes other than fire. Tim Meyer, Provincial Pathologist @ OFRI can provide advice on use of Landsat to map disease outbreaks. Rob Frech, AFFMB (SSM) can provide advice on fire depletions.	1	Natural depletions must be reported in RPFO	
1.4.3 Inventories Fish and wildlife inventory data is deficient for most forest management units. In order to ensure that plans consider the best scientific information available, better inventories are required. In lieu of inventory information, predictive models can be used.	A-7	Computer software to calculate shoreline slopes from OBM data. Training can be provided in inventory methods for collecting data on moose aquatic feeding areas, etc. Extension provided by the Wildlife Assessment Units, Steve McGovern, Simon Bridge, Chiadih Chang and Bob Watt @ NEST, Brian Naylor (NB) and Steve Kerr (Kem) @ SCSS, Kim Armstrong and Terry Marshall @ NWST, and Rob Steedman and Rob Mackereth @ CNFER.	1,2,3	Fisheries and wildlife information must be available (FMPM pg A-7).	
1.4.3 Inventories 2.5 Monitoring and Assessment Knowledge of inventory and assessment methods.	A-7, A-133	Extension advice provided by Al Corlett and Margaret McLaren (Bra) and Murray Woods and Merilyn Twiss (NB) @ SCSS.	1,2	to use when developing the Monitoring & Assessment section of FMP	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
1.4.3 Inventories 2.2.2 Forest Description Knowledge of Ecological Land Classification and Mapping	A-7, A-15	Extension advice provided by Brenda Chambers @ SCSS (NB).	1,2	necessary for developing silvicultural ground rules and ecosite mapping	
1.4.3 Inventories 2.3.3.2 Management Alternatives Ability to translate FRI data into FEC Ecosite description using SFMM Tool.	A-7,A-48	Software has been developed for Central Ontario ecosites. Contact Fred Pinto or Brian Naylor @ SCSS (NB) for information. Contact Bob Watt or Simon Bridge @ NEST, Gerry Racey or Bill Towill @ NWST.	1,2,3,4	Assists in forming ecosite based forest units and mapping ecosites for the 5 year planned activities, in order to link to the SGRs	
1.4.4 Values Map Ability to identify cultural and heritag values for Values Maps	A-8	Luke Dallabona, Archeological Research Scientist, SSM, can provide advice.	1	Required to identify known and high potential cultural heritage areas.	
Values maps must be produced for all FMPs. Digitized values maps are easier to update and to use for mapping certain Areas of Concern.		District GIS Officers. Digital values data can be derived from the NRVIS data base.	1	Values maps are required.	
2.2.2 Forest Description	A-15				

SCIENCE REQUIREMENT	PAGE REFERENCES	CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT	WHEN TO CONSIDER IN THE PLANNING PROCESS	LEGAL REQUIREMENT	ISSUE ADDRESSED YES OR NO
Need to provide a description of the forest.		Digital map of ecoprovinces, regions and districts, based on productivity, is available from Ajith Perera @ OFRI. It is known as the Hierarchical Ecoregional Framework (HEF), Spatial coverage of surficial geology and terrain is also available from OFRI. Additional advice can be provided by Kim Taylor @ NEST, Peter Uhlig @ OFRI, Dennis Joyce @ SSM, Rob Rempel @ CNFER or Phil Elkie @ NWST. Literature on forest regions/sub-regions is available (eg. Rowe, Hills).	1,2	Digital map of ecoprovince, regions and districts not a legal requirement additional information would enhance FMP	
2.2.2 Forest Description 2.4 Operational Planning Ability to use digitized elevation information for viewscape analysis, watershed level planning, species suitability, etc.	A-15,A-83	Digitized elevation information will be accessible through NRVIS. Extension advice and support on the Digital Elevation Model is available from Dennis Joyce @ SSM and Bob Sinclair @ OFRI. Advice can be provided by Simon Bridge and Chiadih Chang @ NEST and Rob Rempel, Rob Steedman and Rob Mackereth @ CNFER, John Fraser (Pet) and Bill Crins (Bra) @ SCSS, and Phil Elkie @ NWST.	3,4	Would assist in developing AOC prescriptions where viewscapes are recommended.	
2.2.2.1 Geology, Soils and Sites Knowledge of the physiographic framework of landscapes and the influence of geologic structure and processes on ecosystems.	A-15	Extension advice provided by John Fraser @ SCSS (Pet).	1,2	assist in developing the Forest Description Section and understanding the connection of geologic structure and ecosystems	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
2.2.2.2 Historic Forest Condition 2.3.3 Management Alternatives 2.4 Operational Planning Knowledge of emulating natural disturbances, landscape ecology, and analysis of landscape patterns. Linkages between these and exceptions to the Timber Management Guidelines for the Provision of Moose Habitat. Linkages with caribou habitat management.	A-16, 46, 83	Extension advice and presentations to LCCs and planning teams provided by CNFER. Contact the manager. Bob Watt @NEST, Brian Naylor (NB), Bill Crins (Bra) and Paul Prevett (Lon) @ SCSS, Bob White (Ken) and Gerry Racey (TB) @NWST, Rob Rempel and Art Rodgers @ CNFER and John McNicol @ Terrestrial Ecosystems Branch (TB) can provide advice.	2,3,4	Required information for FMP development	
2.2.2.2 Historic Forest Condition 2.3.4 Analysis of Management Alternatives Knowledge of the Landscape Ecological Analysis Package (LEAP) model, fragmentation, landscape ecology, spatial landscape statistics and GIS integration.	A-16, A-58	Extension advice provided by Bob Watt, and Simon Bridge @NEST , Bob White (Ken) and Gerry Racey (TB) @ NWST, Rob Rempel @ CNFER, Brian Naylor (NB), Scott Reid (Bra) and John Fraser (Pet) @ SCSS, and Ajith Perera, Dave Baldwin and Frank Schnekenburger @ OFRI. LEAP workship provided by Bob Watt. Landscape ecology extension advice provided by Kim Taylor @ NEST.	1,2,3,4	Required to analyze management alternatives in FMP	
2.2.2.2 Historic Forest Condition 2.4.2 Selection of Areas of Operations	A-16, A-83				

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Need to determine historic fire regimes/cycles for a forest in order to do landscape level planning to emulate natural disturbances.		ONFIRE model helps predict fire regimes. Extension advice provided by Ajith Perera @ OFRI, John McNicol @ Boreal Science Unit (TB), Simon Bridge and Bob Watt @ NEST, Phil Elkie @NWST and by CNFER (contact the manager). Provincial database of wildfires from 1920 to 1995 is available on a CD from Dave Baldwin or Ajith Perera @ OFRI. Extension advice provided by Dave Heaman @ EFR (Pet), Terry Curran (Dry) @ WFR, Rob Frech @ AFFMB and Brian Naylor (NB) @ SCSS. Rob Frech can provide advice on SFMM inputs for fire disturbance.	2,3	Information to assist in establishing FMP objectives and the layout of harvest areas	
2.2.2.3 Current Forest Condition 2.3.2.2 Criteria to Assess Forest Sustain. 2.5 Monitoring and Assessment Ability to quanitatively describe forest health and stress status in order to evaluate the impacts of forest management practices on forest ecosystems. Need to develop indicators to measure the sustainability criterion Forest Condition and Ecosystem Productivity.	A-16,42, 133	Literature regarding the use of remote sensing to assess forest condition. Data and estimation techniques and studies. Extension advice and contacts provided by Dave Smith , Paul Sampson and Gina Mohammed @ OFRI, John Parton @ NEST, Al Corlett (Bra) and Murray Woods (NB) @ SCSS, and John McNicol @ Terrestrial Ecosystems Branch (TB).	2,3	Net Primary Productivity needs to be calculated for the sub-regional area and the determination of the bounds of natural variation	
2.2.2.3 Current Forest Condition 2.3.2.2 Criteria to Assess Forest Sustainability	A-16,A42				

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Knowledge of ecosystem management, biodiversity conservation, sustainability indicators, wildlife habitat, impacts of forest management activities (conifer release - Lautenschlager) and natural disturbances on ecosystem components and landscape processes. Landscape level strategies for restoration of degraded ecosystems.		Extension advice and published papers by R.A. Lautenschlager @OFRI. Extension advice provided by Bob Watt and John Parton @ NEST, Gerry Racey, Brian Polhill and Bill Towill @ NWST, Al Corlett and Margaret McLaren (Bra), John Fraser (Pet), Fred Pinto (NB) and Paul Prevett (Lon) @ SCSS, Rob Rempel @ CNFER, and John McNicol @ Terrestrial Ecosystems Branch (TB).	2,3	Required for analysis of management alternatives in FMP	
2.2.2.3 Current Forest Conditions 2.3 Strategic Dir. and Determin. of Sust. 2.4 Operational Planning Knowledge of Marten Guidelines and Marten Habitat Supply Model. Ability to complete Table FMP-5 re marten habitat supply.	A-16,38,83	Extension advice and workshops by Bob Watt @ NEST, Brian Naylor @ SCSS (NB). Extension advice by Phil Elkie @ NWST and Jim Baker @ Forest Program Development Section (Pet).	2,3,4	Required in strategic and operational planning in FMP	
2.2.2.4 Other Forest Resources 1.4.3 Inventories Wildlife Assessment Program: Will provide Provincial and Regional wildlife population trend information to identify species of concern. Will also provide context and sustainability test of habitat tracking of selected Species: see A-24. Knowledge of wildlife habitat inventory methods.	A-33, A-7	Contact the NE (Dean Phoenix), NW (Neil Dawson) or SC (Marilyn Twiss - NB) Wildlife Assessment Units, also Bob Watt @ NEST, Margaret McLaren @ SCSS (Bra) and Art Rodgers @CNFER.	1,2,3	Include available information on the quality, areal extent and population status of the species (FMPM pg. A-33)	
2.3 Strategic Direction and Determination of Sustainability	A-38				

SCIENCE REQUIREMENT	PAGE REFERENCES	CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT	WHEN TO CONSIDER IN THE PLANNING PROCESS	LEGAL REQUIREMENT	ISSUE ADDRESSED YES OR NO
Ability to use spatial analysis tools to assist in landscape planning.		CNFER can provide FMP training sessions/workshops - "Planning Your Analysis". Contact the manager or Rob Rempel. Also contact Bob Watt or Simon Bridge @ NEST, Brian Naylor (NB), Scott Reid (Bra) and John Fraser (Pet) @ SCSS, or Phil Elkie @ NWST.	2,3	Tools are required to assist in the spatial test for sustainability	
Ability to define/interpret natural variation.		Extension advice provided by Simon Bridge, Bob Watt and John Parton @ NEST and Bill Crins (Bra) and Brian Naylor (NB) @ SCSS.	2,3,4	Required to define bounds of natural variation for many indicators of forest sustainability	
Knowledge of stand development and regulation.		Extension advice provided by Al Corlett (Bra), Ken Elliott (Lon) and Eric Boysen (Kem) @ SCSS, Alison Luke and Jim Duncan @ NEST, Bill Towill and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST.	2,3	Required in strategic and operational planning in FMPs	
Habitat Supply Analysis software for moose, deer, marten, pileated woodpecker and red shouldered hawks.		Software has been developed by the SCSS for areas south and east of Sault Ste. Marie. Contact Brian Naylor or Fred Pinto @ SCSS (NB). Also contact Bob Watt or Simon Bridge @ NEST or Phil Elkie @ NWST for advice.	2,3	Required to analyze spatial distribution of proposed harvest areas in meeting FMP objectives	
Development of yield curves and calibration to local conditions. Knowledge of Density Management Diagrams and pre-commercial thinning impacts.		Extension advice and formal training provided by John Parton @NEST. Extension advice provided by Jim Duncan @ NEST, Bill Towill and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST, and Murray Woods (NB) and Al Corlett (Bra) @ SCSS.	1,2,3,4,5	Required to develop yield curves for modelling purposes (SFMM)	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
2.3 Strategic Direction and Determination of Sustainability 2.2.2.3 Current Forest Conditions Ability to define/interpret 2nd order watersheds.	A-38, A-16	Extension advice provided by Chiadih Chang and Simon Bridge @ NEST, Kim Armstrong and Terry Marshall @ NWST, and Dave Ferguson (Pet) @ LUPB.	1,2,3,4	Required for table FMP-6	
2.3 Strategic Direction and Determination of Sustainability 2.4.3 Prescriptions for Operations Knowledge of old growth forests, management and silviculture	A-38, A-86	Extension advice provided by John Parton, Wally Bidwell and Alison Luke @ NEST, Fred Pinto and Brenda Chambers (NB), Al Corlett (Bra), Cathy Neilsen (Kem) and Ken Elliott (Lon) @ SCSS, Bill Towill and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST and Bill Cole and Tim Meyer @ OFRI.	2,3,4	Required for strategic & operational planning in FMPs	
2.3 Strategic Direction and Determination of Sustainability 2.2.2.3 Current Forest Condition Knowledge of hydrogeology, watershed processes and impacts. Knowledge of watershed management.	A-38, A-16	An annual workshop can be delivered by Chiadih Chang @ NEST. Extension advice provided by Steve McGovern @ NEST, Kim Armstrong @ NWST and Rob Steedman and Rob Mackereth @ CNFER. The Northeast Region Engineering Unit will provide watershed management hydrology critiques.	1,2,3,4	Could assist in strategic & operational planning	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Expertise in the use of GIS for planning - spatial analysis and modelling and/or site specific management objectives		Extension advice provided by Chiadih Chang, Simon Bridge and Bob Watt @ NEST, Phil Elkie @ NWST, John Fraser (Pet) and Scott Reid (Bra) @SCSS, Bill Cole @ OFRI and Rob Rempel @ CNFER.	1,2,3,4	Required for strategic planning and determination of sustainability	
2.3 Strategic Direction and Determination of Sustainability Ability to develop criteria and indicators for sustainability. Knowledge of Canadian Council of Forest Ministers (CCFM) and CFSA requirements.	A-38	Extension and FMP training sessions provided by Bob Watt @ NEST. Extension advice provided by Jim Duncan and John Parton @ NEST, Bill Towill and Gerry Racey @ NWST, Cathy Neilsen (Kem), Merilyn Twiss and Brian Bachelor (NB) @ SCSS, Dave Morris @ CNFER and John McNicol @ Terrestrial Ecosystems Branch (TB).	2,3	Need to deliver comprehensive training	
2.3 Strategic Direction and Determination of Sustainability 2.4 Operational Planning Knowledge of how to set objectives for maintaining biological diversity at the site and landscape level.	A-38, A-83	Extension advice provided by Bob Watt, Simon Bridge and Kim Taylor@ NEST, Gerry Racey and Bill Towill @ NWST, Brian Naylor and Fred Pinto (NB), Bill Crins (Bra) and Paul Prevett (Lon) @ SCSS.	1,2,3,4	Required for developing FMP objectives	
2.3.2.2 Criteria to Assess Forest Sustain. 2.4.3.2 Prescriptions for All Other Areas	A-42, A-92				

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Knowledge of impacts of forest management activities, primarily harvesting, on future stand nutrition and site productivity.		Extension advice provided by Dave Morris @ CNFER, Gerry Racey, Bill Towill, Brian Polhill, Bob White and Colin Bowling @ NWST, John Parton, Alison Luke and Jim Duncan @ NEST, and Scott Reid (Bra) and Murray Woods (NB) @ SCSS.	2,3	Assist in understanding the Sustainability Criteria "Forest Condition & Ecosystem Productivity	
2.3.2.2 Criteria to Assess Forest Sustainability 2.3.3.2 Management Alternatives Knowledge of the impacts of non-renewable resource management activities (eg. aggregate extraction) on landscape scale ecological processes and sustainability. Knowledge of restoration of degraded ecosystems, especially as a result of extraction. Ability to develop approaches to the analysis of aggregate resource distribution, to develop resource access strategies and to evaluate geoscience and aggregates aspects of FMPs.	A-42, A-47	Extension advice provided by John Fraser @ SCSS (Pet).	2,3	to use in 5 & 20 year access planning	
2.3.3 Management Alternatives Knowledge of potential impacts of forest management practices, particularly silviculture practices, on species and genetic diversity.	A-46	Extension advice provided by Dennis Joyce @ SSM, Bill Towill and Brian Polhill (TB) and Colin Bowling (Ken) @ NWST, Al Corlett (Bra) and Cathy Neilsen (Kem) @SCSS, and Bob Watt @ NEST.	2,3	Assist in establishing best practices in order to meet FMP objectives for species and genetic diversity	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Growth and yield algorithms which emulate actual conditions in natural and managed stands		Extension advice and assistance in working with planning teams to develop Forest Unit specific yield curves provided by David Smith @ OFRI, Bill Towill, Brian Polhill and Colin Bowling @ NWST, Murray Woods (NB) @ SCSS, and John Parton and Jim Duncan @ NEST	2	Growth & yield curves are required in forest models	
Knowledge of successional pathways for inclusion in SFMM model		Software has been developed to predict changes in tree species composition in undisturbed stands in NB, Pembroke and Algonquin Park Districts. Changes can be predicted at the stand level or forest management unit level. Contact Fred Pinto @ SCSS (NB). Extension Advice provided by Alison Luke, John Parton, Jim Duncan and Kim Taylor @ NEST, Al Corleti and Scott Reid @ SCSS (Bra), Brenda Chambers @ SCSS (NB), Bill Towil, Gerry Racey and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST..	2	Required in SFMM model	
2.3.3.2 Management Alternatives Knowledge of plant ecology, diversity and early succession	A-46	Extension advice provided by Wayne Bell @ OFRI and Brenda Chambers @ SCSS (NB).	2,3	assist when developing successional pathways in SFMM, operational prescriptions, silvicultural ground rules	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Knowledge of policies related to forest health and silviculture activities (eg. red pine stump treatments). Knowledge of appropriate silviculture treatments in light of past stand disease history and potential future disease concerns.		Extension advice provided by Sylvia Greifenhagen or Tim Meyer @ OFRI. Extension advice provided by Jim Duncan @ NEST, Bill Towill and Brian Polhill (TB) and Bob White (Ken) @ NWST, and Al Corlett (Bra) @SCSS.	2,3	Assist in developing silvicultural prescriptions	
Knowledge of how to incorporate the silviculture guides into the development of Forest Units and Silvicultural Ground Rules.		Extension advice provided by Alison Luke, John Parton and Wally Bidwell @NEST, Murray Woods (NB) and Al Corlett (Bra) @ SCSS, and Bill Towill, Brian Polhill, Bob White and Colin Bowling @ NWST. Annual workshop on Forest Unit development and the silviculture guides provided by Alison Luke @ NEST.	2	Required to develop FMP Sivicultural Ground Rules	
Knowledge of Boreal Mixedwood management.		Extension advice and management interpretations provided by Blake MacDonald, Jim Rice, and Tim Meyer @ OFRI, Bill Towill @ NWST, Al Corlett (Bra) and Brian Batchelor (NB) @ SCSS, and Wally Bidwell @ NEST. Extension Notes have been produced. Scientific advice relative to Tables FMP-10 and FMP-13 provided by Blake MacDonald and Jim Rice @ OFRI.	2,3	assist in developing silvicultural ground rules and site specific prescriptions	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Strategies to ensure success of artificial regeneration efforts.		Assessment of the physiological condition of stock prior to planting can be done by the Stock Quality Assessment Program @ OFRI. This practice may be identified as a silvicultural strategy in the FMP. Contact is Steve Colombo. Literature and a provincial database provide additional support. John Parton, Alison Luke and Jim Duncan @ NEST, Bill Towill and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST, and Silvia Strobl (Kem) and Andree Morneault (NB) @ SCSS can provide extension advice.	3,4	FMP implementation - planting stock assessment to determine physiological condition of stock prior to planting	
Knowledge of Tolerant Hardwood management, uneven-aged management, silviculture and stand dynamics.		Extension advice and occasional presentations provided by Bill Cole @ OFRI. Extension advice provided by Al Corlett (Bra) and Brian Batchelor (NB) @ SCSS	2,3	Assist when developing silvicultural ground rules and site specific prescriptions	
Knowledge of vegetative competition, vegetation management options, plant autecology. Databases for plant diversity and succession for clearcuts, motor-manual cutting, mechanical cutting, herbicides, animal grazing, white pine shelterwood, and mechanical site preparation.		Extension advice and databases provided by Wayne Bell @ OFRI. Extension Advice provided by Alison Luke and Jim Duncan @ NEST, Bill Towill and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST, Paul Prevett (Lon), Andree Morneault (NB) and Silvia Strobl (Kem) @SCSS.		Assist in developing sivicultural ground rules	
Assistance with the development of silvicultural strategies		Extension advice provided by Alison Luke, John Parton and Jim Duncan @ NEST, Bill Towill, Gerry Racey and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST, Eric Boysen (Kem), Ken Elliott (Lon) and Al Corlett (Bra) @ SCSS, and Wayne Bell @ OFRI.	2,3	Required in FMPs	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Knowledge of careful logging practices to develop silvicultural strategies.		Extension advice provided by Brian Batchelor @ SCSS and Alison Luke and John Parton @NEST, and Brian Polhill and Bill Towill @ NWST.	2,3	Assist in developing silvicultural strategies	
2.3.3.2 Management Alternatives 2.5 Monitoring and Assessment Knowledge of Free-to-Grow and regeneration assessments and regeneration standards.	A-46,A-133	Extension advice provided by Al Corlett (Bra) and Fred Pinto (NB) @ SCSS, John Parton and Jim Duncan @ NEST, Bill Towill and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST, and Fred Pinto @ SCSS.	2,3,4	Assist in developing a monitoring and assessment program for inclusion in the FMP	
2.3.3.2 Management Alternatives 2.4.3 Prescriptions for Operations Interpretation of the silvicultural guides for the development of Silvicultural Ground Rules and operational prescriptions.	A-49,A-86	Extension advice provided by Alison Luke, Wally Bidwell, Jim Duncan and John Parton @NEST, Al Corlett (Bra)(hardwoods), Brian Batchelor (NB) (hardwoods), Fred Pinto (NB)(softwoods), Scott Reid (Bra) and Silvia Strobl (Kem)(plantations) @ SCSS, and Bill Towill and Brian Polhill (TB) and Colin Bowling and Bob White (Ken) @ NWST.	2,3,4	Assist in the development of the Silvivultural Ground Rules	
2.3.3.2 Management Alternatives 2.4.3.2 Prescriptions for All Other Areas Advice on autecology and on the use of herbicides for stand establishment.	A-49, A-92	Extension advice provided by Alison Luke, Wally Bidwell and Jim Duncan @ NEST, Brian Polhill and Bill Towill @ NWST, Silvia Strobl (Kem) and Andree Morneault (NB) @ SCSS, and Wayne Bell @ OFRI.	2,3	Assist in developing Silvicultural Ground Rules	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
2.3.3.2 Management Alternatives 2.4.3.2 Prescriptions for All Other Areas Knowledge of Forest Ecosystem Classification and Silviculture Guides relative to silviculture ground rules and forest unit development. FEC Mapping requirements.	A-47, A-92	Extension advice provided by John Parton, Alison Luke and Simon Bridge @NEST, Brenda Chambers @ SCSS (NB), Al Corlett @ SCSS (Bra), Bill Towill, Gerry Racey and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST . FEC workshops offered by Kim Taylor @ NEST	2,3,4	Assistance is required in using new guides and the site type/ecosite classifications	
2.3.3.2 Silvicultual Strategies Knowledge of plantation response to spacing and thinning to incorporate into SFMM modelling and silviculture ground rules.	A-57	Decision support software has been developed for red pine, white pine, jack pine and black spruce. Contact Fred Pinto or Murray Woods @ SCSS (NB). Extension advice provided by Scott Reid (Bra), Ken Elliott (Lon) and Eric Boysen (Kem) @ SCSS, John Parton, Alison Luke and Jim Duncan @ NEST, Bill Towill and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST.	2,3	Forest model inputs that are required in SFMM	
2.3.3.2 Silvicultural Strategies Knowledge of methods for evaluating silvicultural effectiveness.	A-57	Extension advice provided by Fred Pinto (NB), Al Corlett and Scott Reid (Bra) @ SCSS, Alison Luke, John Parton and Jim Duncan @ NEST, Bill Towill and Brian Polhill (TB) and Bob White and Colin Bowling (Ken) @ NWST.	3,4	Effectiveness monitoring is required for exceptions to the recommendations in the silvicultural guides	
2.3.4 Analysis of Management Alternatives	A-58				

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Expertise in SFMM modelling.		Extension advice and training provided by Al Corlett and Scott Reid (Bra) @ SCSS, Sylvain Levesque and Jim Duncan @ Northeast RPU, and Phil Elkie @ NWST.	2,3	Required when developing FMP	
2.3.8 Primary Road Corridors 2.4.5.1 Primary and Secondary Road Corridors Knowledge of road construction in various terrains, road alignments, water crossing construction and cost esimates for roads and crossings.	A-80, A-121	Critiques of road alignments, etc. prolvided by the Northeast Region Engineering Unit - Bob Wilson, Ron Lapointe, Allan Chow. Water crossing training also provided.	2,4	Requirement to plan primary and secondary road corridors and water crossing locations.	
2.4.3 Prescriptions for Operations Knowledge of the ecology/autecology of various plant species, including vulnerable/threatened/ endangered species, and the potential impacts of forest management operations on them. Ability to develop site specific prescriptions to protectand/or restore particular plant species/ecosystems and ensure their continued existence.	A-86	Extension advice provided by Kim Taylor, Wally Bidwell and Alison Luke @ NEST, Bill Towill, Gerry Racey and Brian Polhill (TB) and Colin Bowling (Ken) @ NWST, Paul Prevett (Lon) and Andree Morneault (NB) @ SCSS.	3	Information required in order to develop site specific prescriptions	
Knowledge of ecology of wetlands and riparian areas (and other communities) and impacts of forest management activities on them.		Extension advice provided by Kim Taylor and Steve McGovern @ NEST, Gerry Racey and Kim Armstrong @ NWST (T. Bay), Angus Norman and Paul Prevett (Lon), Brian Naylor (NB) and Kerry Coleman (Kem) @ SCSS, and Rob Steedman, Rob Mackereth and Terry Marshall @ CNFER.	3	Information required when developing prescriptions in order to protect these areas	

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Knowledge of impacts of forest management operations on aquatic habitat.		Aquatic Habitat Training Workshop provided by Steve McGovern @ NEST. Extension advice provided by Henk Rietveld (Bra) @ SCSS, Kim Armstrong and Terry Marshall @ NWST, and Rob Steedman and Rob Mackereth @ CNFER.	1,2,3,4	Information required in order to develop site specific prescriptions	
Knowledge of requirements for cavity tree retention/snag management.		Extension advice and field trips provided by Bob Watt @ NEST, Gerry Racey @ NWST and Brian Naylor @ SCSS.	2,3	Required for implementation of provincial implementation manuals	
Knowledge of management and protection techniques for protected/natural areas, and application of landscape ecology theories to these areas.		Extension advice provided by Kim Taylor, Bob Watt and Simon Bridge @ NEST, Gerry Racey @ NWST, John Fraser (Pet) and Bill Crins (Bra) @ SCSS, and Will Kershaw (Sudbury) and John Thompson (Tim) @ Ontario Parks Northeastern Zone.	2,3	Information required when developing prescriptions in order to protect these areas	
2.4.3 Prescriptions for Operations 2.4.5 Access Roads Knowledge of water crossing impacts and sediment control measures.	A-86, A-121	Extension advice provided by Steve McGovern @NEST, Terry Marshall and Kim Armstrong @ NWST, Rob Mackereth and Rob Steedman @ CNFER and Henk Rietveld (Bra) @ SCSS.	3,4	Assistance when developing specific water crossing conditions to protect the aquatic ecosystem	
2.4.3 Prescriptions for Operations 2.2.2 Forest Description	A-86				

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Knowledge of wildlife habitat requirements for various species (eg. caribou, ospreys, eagles, herons, etc.).		Extension advice and field trips provided by Bob Watt @ NEST, Gerry Racey @ NWST and Brian Naylor @ SCSS. Literature references can be provided. Extension advice provided by the Wildlife Assessment Units, and Margaret McLaren (Bra) @ SCSS.	2,3,4	Assist in developing prescriptions in order to protect habitat requirements for various species	
2.4.3.1 Prescriptions for Areas of Concern Knowledge of the Timber Management Guidelines for the Protection of Fish Habitat, the impacts of harvesting adjacent to fisheries,and forest-lake ecology.	A-87	Extension advice provided by Chiadih Chang, John Seyler, Charles Hendry and Steve McGovern @ NEST, Kim Armstrong and Terry Marshall @ NWST, Henk Rietveld (Bra) @ SCSS, Bill Cole @ OFRI, and Rob Steedman and Rob Mackereth @ CNFER.	3	Assistance required when implementing provincial guidelines	
2.4.3.1 Prescriptions for Areas of Concern 2.4.5 Access Roads Knowledge of the use of the MTO watershed calculation methods for determining water crossing sizes and ability to calibrate to local conditions. Knowledge of how to maintain natural channel function and avoid aquatic habitat fragmentation.	A-87, A-121	Extension advice provided by Chiadih Chang and Steve McGovern @ NEST in cooperation with the Northeast Region's Engineering Unit. Extension advice provided by Terry Marshall and Kim Armstrong @ NWST, Henk Rietveld (Bra) @ SCSS, and Rob Steedman and Rob Mackereth @ CNFER.	3,4	Assistance when determining bridge or culvert size installation specifications at the AWS stage	
2.4.4 Forecast of Harvest, Renewal and Tending Operations	A-94				

SCIENCE REQUIREMENT	*PAGE REFERENCES*	*CURRENT REFERENCES, CONTACTS AND AVAILABLE SUPPORT*	*WHEN TO CONSIDER IN THE PLANNING PROCESS*	*LEGAL REQUIREMENT*	*ISSUE ADDRESSED YES OR NO*
Ability to predict climatic variables, such as temperature and precipitation, for a given geographic location. This information can be used to plan tree seed requirements and limits to species' ranges.		Extension and advice on use of the software SEEDWHERE (used to predict seed demand) provided by Dennis Joyce @SSM. Extension advice provided by Simon Bridge @ NEST, Cathy Neilsen (Kem) @ SCSS, and Phil Elkie @ NWST.	4	Assist in developing the Renewal Support section of the FMP	

One of the purposes of the Protocol is to identify science support needs for FMP production. Science needs will be reviewed annually to help determine program priorities. The ***FMP Science Needs*** table includes needs perceived as important by various people. It is a preliminary list of ideas and is not meant to be all-inclusive. The list will be added to throughout the year as new science needs are identified. It will be amended annually and included with the revised version of the Protocol. The Regional FMP teams will provide more detail for the blank fields following discussions on priorities and the relationship of the individual science needs to legal requirements.

Appendix III - FMP Science Needs

FMP MANUAL PAGE REFERENCE AND SCIENCE NEED	*CONTACTS AND SUPPORT NEEDS*	*LEGAL REQUIREMENTS*
1.4.2 Report of Past Forest Operations Is there a need for software to summarize annual report tables electronically or to combine annual stand listings? How can we access stumpage revenue information easily, including trust fund inputs. Is there a need for software? Can we develop software to integrate AIRs and RPFO-12? Is any work required to develop measurable forest sustainability criteria or means of measuring them (e.g.. landscape pattern and diversity indices, habitat supply models, net primary productivity, water yields, clearcut sizes)? Identify the models that will need to be used to produce the RPFO (e.g.. SEIM for Value Added, LDA, etc.)		
1.4.3 Inventories Need an efficient free to grow inventory technique How can this be done reliably with out intensive on the ground surveys?	Development	
Need to develop credible inventory technique to differentiate between cold and warm water, especially streams. Need a predictive technique that is less intensive than the present lake /stream inventory method.	Development	
Inventories: Record keeping and inventory: Need system for tracking on the ground activities and accounting for these into new inventory	Development	

FMP MANUAL PAGE REFERENCE AND SCIENCE NEED		*CONTACTS AND SUPPORT NEEDS*	*LEGAL REQUIREMENTS*
Fish and wildlife inventory data is deficient for most forest management units. In order to ensure that plans consider the best scientific information available, better inventories are required. In lieu of inventory information, predictive models may be developed. Subject areas include fish species present, critical fish habitat, shoreland slopes, occurrence of, and habitat for, vulnerable, threatened, and endangered species, areas of value to featured species		Computer software to calculate shoreline slopes from OBM data. IDENTIFY ANALYTICAL TOOLS WHICH CAN BE USED TO PREDICT HABITAT VALUE. Staff need training in inventory methods for collecting data on moose aquatic feeding areas, etc.	
1.4.3 Inventories 2.2.3 Current Forest Conditions Need to identify any specialized wildlife habitat requirements (e.g., woodland caribou and esker ridges) and ensure that they are identified as values. After requirements have been identified, the habitats need to be surveyed and placed in an inventory.	A-7	Literature search to determine specialized needs. Funding for inventory work to be undertaken by the districts.	
1.4.4 Values Map Values Map: Record keeping on values	A-8	Development	
2.2.2 Forest Description 2.3.2.1 Direction From Other Sources Incorporating Natural Heritage/Protected Areas into FMPs	A-15, A-41	Direction	
2.2.2.2 Historic Forest Condition Ability to set targets for old growth and restoration of white pine (also 2.3.3)	A-16		
2.2.2.3 Current Forest Condition	A-16		

FMP MANUAL PAGE REFERENCE AND SCIENCE NEED	*CONTACTS AND SUPPORT NEEDS*	*LEGAL REQUIREMENTS*
Need to describe the current function of the forest and current levels of measurable sustainability indicators. How? What parameters? of landscape pattern, forest diversity indices, Habitat supply models, tools for NPP, water yield, and 2nd order streams	Development	
Need to be able to access tools to link ecosites, using Forest Ecosystem Classifications, to parameters by which the forest must be described (e.g. wildlife habitat supply, forest diversity). Determine the most appropriate ecosite groupings for this purpose.	STTU.	
Need to describe the current function of the forest, need to describe the current level of measurable sustainability indicators. How will this information be obtained/compiled? Some of the parameters of current forest condition need more detail. e.g., What landscape pattern indices and forest diversity indices are available?, What habitat supply models are available, What info/tools are available to determine NPP and water yield, How can second-order stream watershed areas be easily determined (using GIS?)		
Landscape Patterns and Forest Diversity Indices FMP-4 Need to develop spatial/non-spatial parameters at Prov/Reg/SubReg scales. LandSat!? FMUs data from LEAP can not rolled up to larger scales. Important to sustainability if a Unit is becoming more or less fragmented/diverse with respect to Natural condition .	Development	
Need science direction on site region forest composition.	Development	
Emulating Natural Disturbance: Sub-regional Disturbance Plans	Development	
Habitat supply models: calibration	Development	
Need Prove/Erg/SubRg big picture using Landsat and Habitat Models. SFMM a poor second choice. McLaren working on species list that should be considered for habitat assessment with respect to logging risk. Need consistent species lists within site regions. FMP-5	Development	

FMP MANUAL PAGE REFERENCE AND SCIENCE NEED	*CONTACTS AND SUPPORT NEEDS*	*LEGAL REQUIREMENTS*
Habitat Selected Species Supply Need a tool to determine minimum marten habitat requirements on a n individual trapline basis that would be capable of supporting a given trapping quota over time. Need direction on maintaining at least some marten habitat on each trapline.	Development	
2.2.2.3 Current Forest Condition - A-24 Landscape Processes Need to develop a detailed methodology to identify and map second order watersheds. This criteria not applied due to the difficulty in identifying these watersheds. Some drainage systems do not lend themselves to conventional classification.	Development	
Defining disturbance separation: Does a stag or bog between two allocated patches constitute a functional separation?	Development	
Need data on NPP at sub regional levels - OFRI (FLEP). Also need data layer for second order watersheds. FMP-6	Development	
Watershed scales of concern in FMPs	Development	
2.2.2.4 Other Forest Resources A-33 Is there a mechanism for determining which species of wildlife are declining on a regional basis and should be addressed in the FMP (i.e.. is there a model or process?) -> The Wildlife Assessment Program!	Contact the NE, NW or SC Wildlife Assessment Units	
Is there a mechanism for determining which species of wildlife are declining on a regional basis and Should be addressed in the FMP (i.e.. is there a model or process)?		
Ref: 2.3.8 Primary Road Corridors: Long Term Access (Road) Planning		

FMP MANUAL PAGE REFERENCE AND SCIENCE NEED	*CONTACTS AND SUPPORT NEEDS*	*LEGAL REQUIREMENTS*
Need to develop a process for strategic long term access planning. Process needs to consider sensitive habitat types and values. 5 year planning lacks the flexibility of time resulting in non timber values being dealt with as constraints.	Development	
Connectivity/ Fragmentation of streams with respect to meta-populations (aquatic ecosystem function). Deals with stream fragmentation from road crossings.	Development	
As above. Also consider impact of access on habitat fragmentation. Identifying the significant and critical habitat in the Other Forest Resources Section will flag the need to Balance access locations with these values.	Direction	
2.2.3 Social and Economic Description A-34 Is there any science or technology required to prepare a standardized database of the social economic profile and transfer this to planning teams?	Development	
Is any science or technology required to prepare a standardized data base of the socioeconomic profile and transfer it to the planning teams?		
2.3.2.2 Criteria to Assess Forest Sustainability A-42 Desired Future Forest Condition: Age class structure and composition	Development	
Identify the predictive models that can be used to estimate the effects of management activities on sustainability indicators for biodiversity, multiple benefits to society, etc. The number, and accuracy of sustainability indicators used in models now is limited by a lack of knowledge (e.g.. impacts of vegetation management on other indicators - the example given in the manual is recreational opportunities. We need to identify what these knowledge gaps are, and what indicators still need to be developed to measure 6 criteria.		

FMP MANUAL PAGE REFERENCE AND SCIENCE NEED	*CONTACTS AND SUPPORT NEEDS*	*LEGAL REQUIREMENTS*
Measures of Biological diversity: Need definition and Science to Measure. Rationale: Too much interpretation applied to this term. Require predictive models to measure indicators of sustainability (e.g. biodiversity.)	Development	
Criteria of Sustainability: Forest Health	Development	
Desired Future Forest: defining Natural Variation	Development	
Indicators of sustainability	Development	
Measures of Sustainability: 6 Criteria & their Indicators. Need predictive models to measure and interpret. Limitations of lack of knowledge Need to be able to assess impacts.	Development	
Emulation of natural disturbance patterns: Need to develop sub-regional plans, also need interim direction until Environmental Guidelines approved.	Development	
Need to develop standards and methods for capturing and mapping local disturbance patterns	Development	
Need approval of Regional species for habitat tracking. (is there a process?) Table incorrect with respect to spatial and non-spatial	Direction	
Science support required for interpretation of model outputs (e.g.. LEAP, Habitat supply)	Expertise	
FMP Tool Integration Guide Nov. 1996 Draft	Training	
Identify the predictive models that can be used to estimate the effects of forest management on sustainability indicators of biodiversity multiple benefits to society etc. Indicators now use in models limited by lack of knowledge.	Training	
Indicators: need Ecoregional boundaries set to provide contact for plan indicators.	Direction	

FMP MANUAL PAGE REFERENCE AND SCIENCE NEED	*CONTACTS AND SUPPORT NEEDS*	*LEGAL REQUIREMENTS*
Criteria Of Sustainability?: Need linkage between planning document indicators and what happens on the ground.	Development	
LEAP: Everything (I) , Interpretations	Development	
Also need to identify what sustainability indicators still need to be developed to measure the 6 criteria.	Development	
2.3.2.2 Criteria to Assess Forest Sustainability A-42, A-24 (Ref. 2.2.2.3) One of the six criteria to assess sustainability is Soil and Water Quality. There are currently no measurable indicators to help with this assessment. We need to gain a better understanding of the hydrological impacts of harvesting within a watershed. If indicators can be developed they may impact on landscape level timber allocation patterns. The Current Forest Condition - Landscape Processes section of the FMPM (Table FMP-6) provides for the measure of water yield as a sustainability indicator. This can be a basis for establishing targets for acceptable change in yield levels.	STTU coordination, CNFER involvement. Identify relevant literature. Link with GIS system for spatial analysis of alternatives.	
2.3.3 Management Alternatives A-46 Spatial analysis requirement for management alternatives: need to develop for NE. Done for NW and SC.	Development	
Need Science support to develop silvicultural strategies.	Development	
Silvicultural Ground rules need information on treatment responses.	Expertise	
Need better understanding of natural succession - successional pathways. Include integration of ingrowth into pathway models.	Development	
Need to develop Old Growth targets. Perhaps use fire cycles? There are guidelines: Conservation Strategy for Old Growth Forest Systems on Crown Lands in Ont., April 1 , 1997. Includes time lines and suggested Science responsibilities for development.	Needs ownership	

FMP MANUAL PAGE REFERENCE AND SCIENCE NEED	*CONTACTS AND SUPPORT NEEDS*	*LEGAL REQUIREMENTS*
Need better understanding of SFMM capabilities and limitations. Not just a wood supply model Can hardwire other inputs.	Training	
Natural disturbance emulation: Need to identify tools, need improved understanding of ecological processes. Need to integrate ecosystem management training with FMP training.	Development	
Spatial habitat supply software and analysis capabilities for selected species developed for S/C Region. Need something similar in other Regions.	Development	
2.3.3.1 Objectives A-46 Social and environmental objectives for forest cover must be identified in the plan. Protected areas may have been identified through another planning process. It may be necessary to develop objectives and strategies in the FMP to help meet the objectives for these protected areas. Planning teams need to know the impacts of forest management activities on the protected areas. There may be a need to develop, or clarify objectives for protected areas outside of the FMP process.	Need to make decisions in sub-regional land use plans regarding the location and role of protected areas in the landscape and whether there is a need for modified operations adjacent to them	
2.3.3.1Objectives A-46 Desired Future Forest: Succession		
2.3.3.2 Strategies A-47 Forest Units - Yield curve information and forest succession predictions must be improved by implementing data collection programs. Silvicultural Ground Rules - Better information is required on silvicultural Treatment response for the SGRs and future yield curves to predict future forest condition. Silvicultural Strategies - NR		

FMP MANUAL PAGE REFERENCE AND SCIENCE NEED	*CONTACTS AND SUPPORT NEEDS*	*LEGAL REQUIREMENTS*
Silvicultural Ground Rules - Need to link silvicultural prescriptions to ecosites, using Forest Ecosystem Classifications. Silviculture Guides must all be updated to create the link, and silvicultural assessments must begin to record site types.	Silviculture Guides.	
2.3.3.2 Strategies - Forest Units and Silvicultural Ground Rules A-48		
Forest Unit definition- Linking to FEC (an ELC)	Development	
Forest Units: Yield curve information and forest succession prediction must be improved by implementing data collection programs.	Development	
Need an ecologically (FEC) defined Forest Units. Silvicultural ground rules applied to Forest Units may not produce the predicted/modeled habitat. FEC based Forest units will allow a more direct translation and prediction of habitat supply.	Development	
FEC - Forest Unit translations re silvicultural Ground rules. Also need for FRI-FEC translation and site type mapping	Development	
Natural origin stand structure characteristics.	Development	
Silvicultural Ground Rules: should include common forest unit prescriptions such as snags retention and other ecosystem management considerations.	Development	
Silvicultural Ground Rules: Better information required on silvicultural treatment response for the SGRs an future yield curves to predict future forest condition	Development	
Silvicultural Ground Rules: spanning (linking) stand level to forest level	Development	
2.3.4 Analysis of Management Alternatives A-58		

FMP MANUAL PAGE REFERENCE AND SCIENCE NEED	*CONTACTS AND SUPPORT NEEDS*	*LEGAL REQUIREMENTS*
Analysis - a model needs to be developed to predict the natural disturbance regime for each management unit in the " no intervention" alternative.	Development	
Should identify other known forest models that may be acceptable alternatives to those that are recommended in the FMPM.	Training	
Sensitivity Analysis and Risk	Development	
Need to develop method for identifying Management Alternatives for habitat objectives.- Relationship to natural variation?	Development	
Analysis processes: Need for development of scoring/weighting system to analyze alternatives in relation to objectives.	Development	
Categories of information where more development is required include: rates of natural succession, yield curves, operability ranges, post-renewal succession rates.	Development	
Need ability to do spatial runs of SFMM. Non spatial run may not be able to meet pattern and age objectives on the ground.	Development	
Analysis Tools: These tools should be referred to in each applicable section of the plan, not just in App IX	Direction	
Limitations of SFMM need to be explained, deficiencies analyzed an develop ways of dealing with these. e.g. Can wood supply optimization be turned off to see what the effect of meting other objectives may be without crashing the model?	Training	
Science need to make SFMM into spatial model or develop a new spatial model that does what SFMM does. Refinement of STANLEY?	Development	
Need to determine bounds of natural variation for landscape/forest diversity and NPP. OFRI's FLEP and further development of "On-Fire" Model may provide this information. Rationale: Preferred management option must fall within natural variation. (FMP-13)	Development	

FMP MANUAL PAGE REFERENCE AND SCIENCE NEED	*CONTACTS AND SUPPORT NEEDS*	*LEGAL REQUIREMENTS*
2.3.4 Analysis of Management Alternatives A-58 Analysis Tools, Forest Dynamics Information - Need to improve the habitat unit classifications in SFMM to adequately define the habitat needs for pine marten. Currently unsuitable forest types (e.g., pure white birch) are being designated as appropriate for marten because of the way they are lumped with other forest types.	SFMM model. Pine Marten Guidelines. Contact Sylvain Levesque @ Northeast Planning Unit and Bob Watt @ NEST	
Analysis Tools, Forest Dynamics Information - Need to develop better knowledge of post harvest succession relative to pileated woodpecker habitat. If we are leaving cavity/snag trees in a cutover, will these areas become suitable habitat sooner than we have previously assumed?	SFMM model. Pileated Woodpecker Guidelines. Contact Sylvain Levesque @ NER Planning Unit and Bob Watt @ NEST	
Need to develop a standard GIS algorithm to identify marten habitat core areas.		
Analysis Tools - these tools should be referred to in each applicable section of the plan, not just in Appendix IX Categories of information where more information is required for SFMM inputs include rates of natural succession, yield curves, operability ranges, post-renewal succession rates Should identify other known forest models that may be acceptable alternatives to those that are recommended in the manual. Analysis - a model needs to be developed to predict the natural disturbance regime for each management unit in "no intervention" alternative.		
Need to consider habitat supply needs for additional species for SFMM analysis.	STTU to coordinate development of needs and main office to incorporate into SFMM	
2.3.5 Selection of Management Alternatives A-62 What is the status of linking SFMM to GIS to allow for a better spatial analysis	Development	
Need support in interpretation of SEIM	Training	

FMP MANUAL PAGE REFERENCE AND SCIENCE NEED	*CONTACTS AND SUPPORT NEEDS*	*LEGAL REQUIREMENTS*
Need training/direction on use of models for decision support (vs misuse for decision making)	Training	
2.3.5 Selection of Management Alternative A-62 What is the status of linking SFMM with GIS to allow for better spacial analysis?(STANLY)		
2.3.6 Available Harvest Area A-71 Similar to above: better information required to with respect to forest development post harvest to predict the impact of harvesting the AHA on the future forest condition.	Development	
Need Science support with respect to forest development after harvest: post renewal succession.	Development	
2.3.6 Available Harvest Area A-71 Better information is required re forest development after harvesting to predict the impact of harvesting the AHA on future forest condition.		
2.3.7 Eligibility A-72 Careful Logging: What is the contribution of this practice to future wood supply (does it give a stand a 10 to 30 year head start? shorter rotations?) and to habitat supply?	Development	
Need to explore operability limit windows with respect to harvesting younger and older stands. G&Y may provide this information.	Development	
2.3.8 Primary Road Corridors A-80 2.2.2.4 Other Forest Resources		

FMP MANUAL PAGE REFERENCE AND SCIENCE NEED	*CONTACTS AND SUPPORT NEEDS*	*LEGAL REQUIREMENTS*
Long Term Access Planning. See comments from Bios/NEST re need for strategic, thoughtful planning process for long term access.	Development	
2.3.8 Primary Road Corridors A-80,A-33 2.2.2.4 Other Forest Resources		
As above. Also consider impact of access on habitat fragmentation. Identifying the significant and critical habitat in the Other Forest Resources Section will flag the need to balance access locations with these values.	Direction	
2.3.8 Primary Road Corridors A-80? 2.2.2.4 Other Forest Resources Science of Roads: Crossings, Distance/area efficiencies, No natural analogue to roads, Ground water-how not to impede, Degree of road lessens, Thoughtful planning process for long term access	Development	
Need to develop a process for strategic long term access planning. Process needs to consider sensitive habitat types and values. 5 year planning lacks the flexibility of time resulting in non timber values being dealt with as constraints.	Development	
2.4.2.1 Selection Criteria A-83 Environmental Guidelines: general direction concerning harvest layout and configuration for each eco-region	Need for interim direction for 1999 and 2000 FMPs	
2.4.2.2 Areas Selected for Operations A-85 Rationale for clearcut areas, which do not represent a range of sizes, or which exceed 260 ha	Need a definition for a clearcut area	
2.4.3.1 Prescriptions for Areas of Concern A-87		

FMP MANUAL PAGE REFERENCE AND SCIENCE NEED	*CONTACTS AND SUPPORT NEEDS*	*LEGAL REQUIREMENTS*
Prescriptions for AOCs	Expertise	
Viewscape analysis tools must be used for remote tourism interests	Need for viewscape analysis tools	
AOC prescriptions when specific direction or recommendation in an implementation manual is not appropriate, or no implementation manual exists	Support in developing prescriptions	
Developing a monitoring program to monitor exceptions	Monitoring approach needed	
2.4.3.2 Prescriptions for All Other Areas A-92 Areas which have been identified as eligible for insect pest management, areas proposed for aerial application of insecticides:	Support on insect infestations (current/projected) information	
Assist in developing sound biological or silvicultural reasons for clearcuts that exceed 260 ha.	Support to provide rationale	
Locations where the various site types described in the SGRs are likely to be encountered within the areas selected for operations for the 5 year term	Software support to translate FEC ecosites to FRI stand maps	
2.4.4.1 Depletion A-94 The forecast harvest area includes the areas available for harvest for harvest in each stage of management for shelterwood management and commercial thinnings for clearcut management	Stage of management and commercial thinning criteria	
Estimates of the forecast harvest volume	Methods to estimate volume	
Forecast the locations and extent of natural depletions, discussion of likelihood, anticipated extent, and where possible, the likely location of natural depletions for the five year term	Tools to forecast natural depletions	
2.4.5.1 Primary and Secondary Road Corridors A-121		

FMP MANUAL PAGE REFERENCE AND SCIENCE NEED		*CONTACTS AND SUPPORT NEEDS*	*LEGAL REQUIREMENTS*
Environmental analysis of alternative roads		Guidelines to assess	
2.4.5.2 Primary and Secondary Roads in Areas of Concern Primary and Secondary Roads in AOCs	A-125	Expertise	
Road planning in an Area of Concern		Environmental effects information for locating roads in an AOC	
Abandonment options inside and outside an Area of Concern		Identify criteria & methods that are environmentally sound	
2.4.5.3 Tertiary Road Conditions Tertiary road & tertiary water crossings conditions	A-127	Standards & conditions to be identified for tertiary roads & tertiary road water crossings	
2.4.7 Comparison of Harvest, Renewal and Tending Forecasts to Sel. Mgmt. Alter. Sustainability assessment	A-131	Support to develop tools and methods to assess sustainability (similar to Sec. 2.3)	
2.5 Monitoring and Assessment Need to develop technique to monitor results of/effects of sang management.	A-131	Development	
The FMPM requires only that an FMP contain provisions for monitoring the effectiveness of prescriptions to protect areas of concern which are not subject to an implementation manual. However, there should be a provincial level monitoring of the effectiveness of prescriptions found in implementation manuals. Implementation manuals should be revised periodically as required to ensure that prescriptions are based on the best available information.		Provincial level coordination of monitoring programs	

ROLES AND RESPONSIBILITIES

Roles and responsibilities of those essential to the success of the Protocol are described below.

Regional Planning Unit

Planning Team Leader

- responsible for ensuring that the Planning Unit adheres to the Protocol
- ensures that necessary training programs are established and training delivered to those involved in forest management

FMP Specialist

- ensures that planning teams are aware of FMPM requirements
- ensures that FMPs meet all legal requirements and are consistent with provincial and regional direction
- organizes a "Science Support" meeting early in the planning process
- organizes FMP Training workshops which include training on available science support
- organizes a debriefing session at the end of the planning process
- leads the Regional FMP Team
- sits as a member of the Provincial FMP Team

Forest Program Specialist

- works with Science Unit and FMP Specialist to coordinate development of regional direction, standards and policies

District Planning Team

- consists of forest industry staff, MNR district staff, and sometimes representatives of Local Citizens Committees
- participates in a Science Support Meeting
- attends FMP Training workshops
- uses Protocol for FMP Science Support to develop Terms of Reference
- produces an FMP which meets all legal requirements and follows all provincial and regional direction
- identifies science gaps and problems encountered with plan production at a debriefing session
- participates as part of the Regional FMP Team

Regional FMP Team

- identifies FMP development problems and science gaps
- updates planning teams on latest tools
- provides direction for FMP development and FMPM implementation

- maintains Protocol for FMP Science Support
- recommends regional level FMP science development priorities to Science Unit manager
- identifies provincial level science development needs to Provincial FMP Team with Regional recommendations for priorities
- provides feedback to new planning teams to give them the benefit of their recent experience

Provincial FMP Team

- identifies FMP development problems and science gaps
- provides provincial direction relative to FMP development
- develops priorities for addressing provincial level FMP science needs

Regional Science Unit

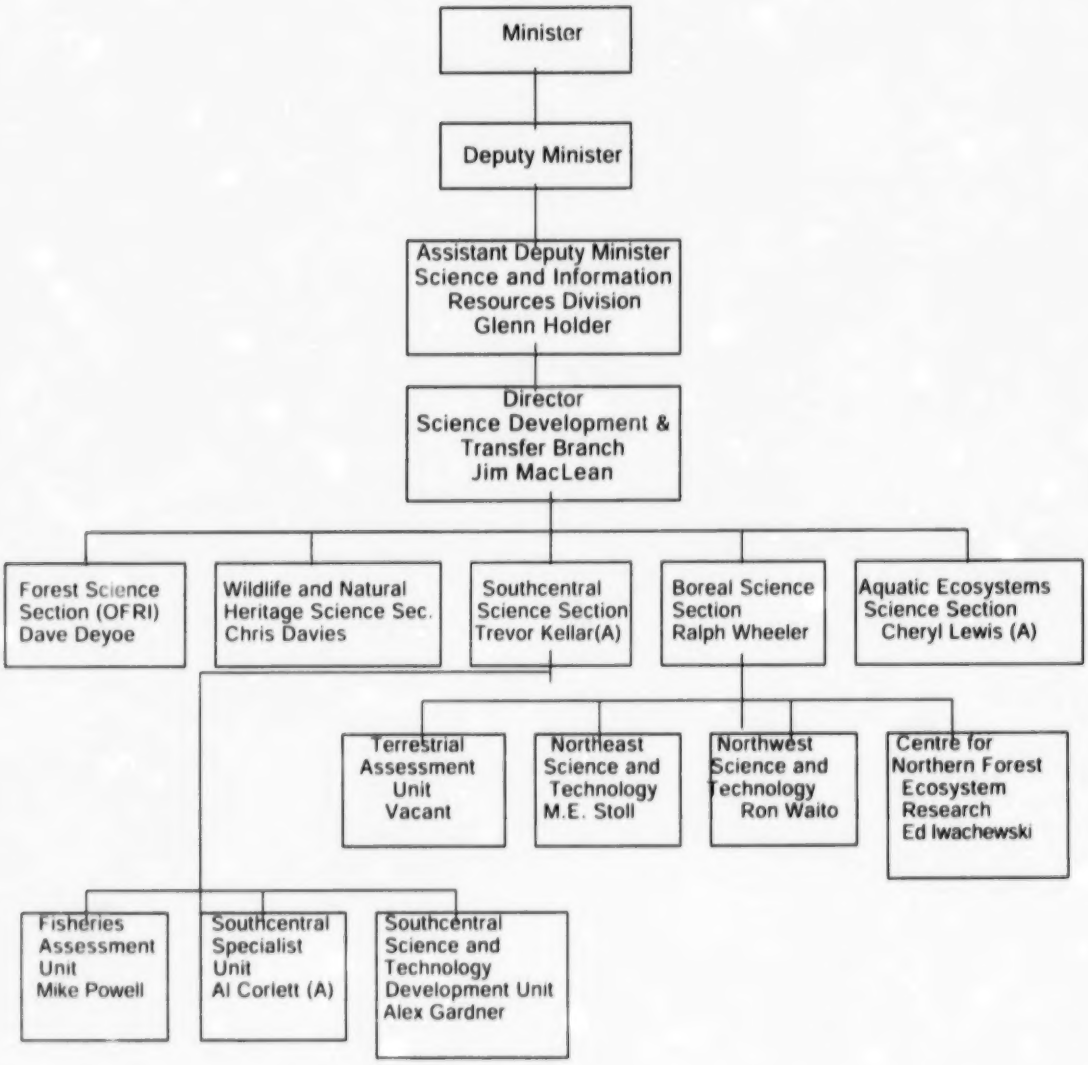
- ensures that FMP science needs are integrated with other science needs when developing annual work programs
- provides extension to planning teams and Regional Planning Unit
- assists Regional Planning Unit to train District staff and industry staff in science related topics to ensure a high competency level in those involved in planning forest management activities
- provides customized training to planning teams with special needs identified at their "Science Support" meeting
- provides a science advisor for each planning team
- participates as part of the Regional FMP Team
- works with the Provincial FMP Team to set provincial level FMP science development priorities

Science Unit Manager

- responsible for ensuring that the Science Unit adheres to the Protocol
- works with the Provincial FMP Team to set provincial level FMP science development priorities

Science Advisor

- is a member of a Regional science unit
- acts as liaison between the planning team, the Science Unit, and other parts of the Science Development and Transfer Branch (eg. CNFER, OFRI)
- ensures that planning teams are aware of available science support


Minister
Deputy Minister
Assistant Deputy Minister
Science and Information
Resources Division
Glenn Holder
Director
Science Development &
Transfer Branch
Jim MacLean
Forest Science
Section (OFRI)
Dave Deyoe
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